

Western Association of Fish and Wildlife Agencies

GREATER SAGE-GROUSE COMPREHENSIVE CONSERVATION STRATEGY



National Sage-grouse Conservation Planning Framework Team
December 2006

The overall goal of the range-wide Strategy is to maintain and enhance populations and distribution of sage-grouse by protecting and improving sagebrush habitats and ecosystems that sustain these populations.



The overall strategy for the management and conservation of greater sage-grouse is to develop the partnerships needed to design and implement actions to support robust populations of sage-grouse and the landscapes and habitats upon which they depend.

GREATER SAGE-GROUSE COMPREHENSIVE CONSERVATION STRATEGY

San J. Stiver

Sage-grouse Conservation Planning Framework Team

Wildlife Coordinator

2184 Richard St.

Prescott, AZ 86301

stiver@cableone.net

Anthony D. Apa

Colorado Division of Wildlife

Research Biologist

711 Independent Ave.

Grand Junction, CO 81505

tony.apa@state.co.us

Joe Bohne

Wyoming Game and Fish Department

Staff Biologist

P.O. Box 3056

Alpine, WY 83128

jbohne@Silverstar.com

S. Dwight Bunnell

Sage-grouse Conservation Planning Framework Team

Team Coordinator

88 W 350 S

Midway, UT 84049

dwightbunnell@comcast.net

Patricia Deibert

U. S. Fish and Wildlife Service

Fish & Wildlife Biologist

5353 Yellowstone Rd., Suite 308

Cheyenne, WY 82001-1599

Pat_Deibert@fws.gov

Scott Gardner
California Dept. of Fish and Game
Upland Game Staff Biologist
1812 Ninth Street
Sacramento, CA 95814
SGardner@dfg.ca.gov

Mark Hilliard
USDI, Bureau of Land Management
Wildlife Specialist
1387 So. Vinnell Way
Boise, Idaho 83709
Mark_Hilliard@blm.gov

Clint McCarthy
U.S. Forest Service, Intermountain Region
Regional Wildlife Ecologist
324 25th Street
Ogden, UT 84401
cmccarthy01@fs.fed.us

Michael A. Schroeder
Wash. Dept. of Fish & Wildlife
Upland Bird Research Biologist
P.O. Box 1077
Bridgeport, WA 98813
grouse@homenetnw.net

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Sage-grouse photos - James Yule

Author Biographies

San J. Stiver

San retired in 2003, after 30 years as a biologist for the Nevada Division of Wildlife. He is currently employed by the National Sage-Grouse Conservation Planning Framework Team. San received his B.S. from the University of Montana in 1974. He has been a member of the Wildlife Society since 1971 and was a member of the Western Sage and Columbian Sharp-tailed Grouse Technical Committee from 1981 – 2003. San has been involved in national and international wildlife conservation issues since 1985. He has worked on sage-grouse as a field biologist, researcher and staff biologist for 30 years.

Anthony D. Apa

Tony has been a sage-grouse research biologist for the Colorado Division of Wildlife since 1999 and has worked with Greater and Gunnison sage-grouse. Before coming to Colorado Tony was the Magic Valley Regional Habitat Manager with the Idaho Department of Fish and Game and was employed by IDFG for 7 years. Tony has been involved with sage-grouse research and/or management since 1988. Tony received his B.S. in Wildlife Biology from the University of Montana in 1981, a M.S. in Fish and Wildlife Science from South Dakota State University in 1985 and a Ph.D. in Wildlife Resources from the University of Idaho in 1998. He currently serves as Chairman of the Sage-Grouse Conservation Planning framework Team and is Colorado's representative to the Western States Sage and Columbian sharp-tailed Grouse Technical Committee.

Joe Bohne

Joe received a B.S degree in Wildlife Biology from the University of Massachusetts in 1970 and received a Master Degree in Wildlife Biology from the University of Montana in 1974. Joe worked for Montana Fish Wildlife and Parks as a temporary biologist in Missoula before starting with the Wyoming Game and Fish Department as a wildlife biologist in 1978. He has worked for the WGFD for 29 years in Wheatland, Laramie and Jackson as a wildlife biologist, regional wildlife coordinator, and staff biologist (current position). Joe represents Wyoming on the Western States Sage and Columbian sharp-tailed grouse Technical Committee, the WAFWA National Sage-grouse Team, is vice-chair of the internal WGFD Sage-grouse Working Group and is the agency lead on the Jackson Hole Local Sage-grouse Working Group. Joe has worked on sage-grouse management and conservation issues for his entire career in Wyoming in addition to work on big game, upland game, and waterfowl management.

S. Dwight Bunnell

For as the last four and one half years Dwight has served as Coordinator for the National Sage-Grouse Conservation Planning Framework Team. Dwight retired from the Utah Division of Wildlife Resources in 2002 after over 32 years of service with DWR. During his career he served as Conservation Officer, Regional Biologist, Upland Game Program Coordinator, Asst. Chief of Game Management, Chief of Game Management, Lands Program Coordinator, and Habitat Council Coordinator. Dwight received a B. S. from the University of Utah and a M. S. in Wildlife Ecology from the University of Idaho.

Patricia Deibert

Pat works on sage-grouse and sagebrush conservation issues for the U.S. Fish and Wildlife Service. She received her Ph.D. from the University of Wyoming where she studied mate selection in greater sage-grouse. Previous employment included working as a biologist for the Wyoming Game and Fish Department and the Utah Division of Wildlife Resources.

Scott Gardner

Scott is the sage-grouse coordinator for the California Department of Fish and Game. He has worked on sage and Columbian sharp-tailed grouse conservation and research for the past 15 years and he is currently serving as Chairman of the Western Sage and Columbian Sharp-tailed Grouse Technical Committee. Scott received a B.S. in Ecology from the State University of New York at Plattsburgh and a M.S. in Wildlife Resources from the University of Idaho.

Mark Hilliard

Mark is a wildlife biologist on the BLM national staff, and has worked for BLM since 1976. His responsibilities include sage-grouse and sagebrush biome conservation and restoration, land health, integrated vegetation management, and fire and fuels management. From 1969-1976, he worked for the Utah Division of Wildlife Resources. He received a B.S. in Wildlife Management from Humboldt State College in 1969, and a M.S. in Wildlife Science from Utah State University in 1974.

Clint McCarthy

Clint has been the Regional Wildlife Ecologist for the Intermountain Region of the Forest Service for the past 7 years. His primary work has been in addressing species viability and biodiversity issues at ecoregional scales, working with other agencies and organizations in the development of species/ecosystem conservation planning strategies, and assisting National Forests in integrating wildlife diversity concepts into Land Management Plans. Prior to this, Clint spent approximately 15 years as the Forest Biologist on three National Forests; the Inyo, Modoc and Custer where he was involved with research and conservation planning efforts in Great Basin and Great Plains ecosystems. Clint received his B.S. degree in Wildlife Management from Humboldt State University, and attended graduate school at the University of Nevada, Reno.

Michael A. Schroeder

Mike has been employed as the Upland Bird Research Biologist with the Washington Department of Fish and Wildlife for the last 14 years. He received his B.S. degree from Texas A&M University, M.S. from the University of Alberta, and Ph.D. from Colorado State University. Mike is a Certified Wildlife Biologist and works on grouse conservation issues at national and international scales. He is a member of the Western Sage and Columbian Sharp-tailed Technical Committee and the Grouse Specialists' Group. Mike has been involved with grouse research and management issues for over 25 years.

Contributing Authors

Michelle Commons-Kemner

Michelle has been employed by the Idaho Department of Fish and Game since 1998, and as a Wildlife Research Biologist since 2000. She received her B.A. from the University of Northern Colorado, Greeley, and her Masters of Natural Resources Management from the University of Manitoba, Canada. She conducted her Master's research on Gunnison sage-grouse in southwestern Colorado. She primarily works on sage-grouse conservation and management issues as she played a major role in developing Idaho's Greater sage-grouse conservation plan, and developing new sage-grouse local working groups. Michelle is currently working with other sage-grouse experts, landscape ecologists, and range scientists in developing a multi-scale habitat assessment framework for sage-grouse and other sagebrush obligate species.

John W. Connelly

Jack has been employed as a Principal Wildlife Research Biologist with the Idaho Department of Fish and Game for the last 23 years. He received his B.S. degree from the University of Idaho and M.S. and Ph.D. degrees from Washington State University. Jack is a Certified Wildlife Biologist and works on grouse conservation issues at national and international scales. He is a member of the Western States Sage and Columbian Sharp-tailed Technical Committee and the Grouse Specialists™ Group. Jack has been involved with sage-grouse research and management issues for over 30 years.

Lisa Langs Stoner

Lisa received her Master's degree in 2004 from Utah State University in Range Ecology. Her research focused on measuring sagebrush structural attributes across spatial scales using remotely-sensed data. She has worked as a research assistant and GIS analyst for the RS/GIS Lab at Utah State University since 2000. Lisa is currently working with the USGS-FRESC Snake River Field Station and NBII (National Biological Information Infrastructure) to develop the Sage-grouse Local Working Group Locator website.

E. Thomas Rinkes

Tom is a sage-grouse/sagebrush species of concern biologist with the Wyoming State Office of the Bureau of Land Management. He received his degree in wildlife resources from the University of Idaho. He has worked for the BLM for the past 28 years in Wyoming and Idaho and has been involved in sage-grouse management issues at both the state and national level.

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Jeff Foss, U.S. Fish & Wildlife Service, Randall Gray, Natural Resources Conservation Service, Margaret Soulen Hinson, American Sheep Industry, Alison Lyon Holloran, National Audubon Society, Chris Jauhola, The Nature Conservancy, Kate Kitchell, U.S. Geological Survey – Forest and Rangeland Ecosystem Science Center, Paul Makela, Idaho Department of Fish & Game, Bruce McCloskey, Western Association of Fish & Wildlife Agencies, Cal McCluskey, Bureau of Land Management, Ron McNeil, LandWise (Alberta, CN), Dave McNinch, Wildlife Commissioner (NV), Terry Messmer, Utah State University, Steve Monsen, Western Ecological Consulting / Society for Range Management, Barry Noon, Colorado State University, John O'Keeffe, National Cattlemen's Beef Association/ Landowner-Rancher, Martin Raphael, U.S.D.A. Forest Service – Pacific Northwest Research Station, David Redhorse, U.S. Fish & Wildlife Service Tribal Liaison, Kerry Reese, University of Idaho, Mark Salvo, Sagebrush Sea Campaign, Lowell Suring, USDA Forest Service, Robert Szaro, U.S. Geological Survey – Biological Resources Division, Western Thayer, Shoshone-Arapahoe Tribes, and Jeff White, Newmont Mines.

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ACRONYMS

AM	Adaptive Management
BIOS	Biogeographic Information and Observation System
BLM	Department of Interior, Bureau of Land Management
BLM Habitat Strategy	BLM National Sage-grouse Habitat Conservation Strategy
BMP	Best Management Practices
CA	Conservation Assessment or Phase 1
Canadian Strategy	Canadian Sage Grouse Recovery Strategy
CBCP	Community-based Conservation Specialists
CBMZ	Columbia Basin Management Zone
CPMZ	Colorado Plateau Management Zone
CRP	Conservation Reserve Program
CWPPs	Community Wildfire Protection Plans
DOD	Department of Defense
DOE	Department of Energy
EAs	Environmental assessments
EISs	Environmental impact statements
ESA	Endangered Species Act
ESR	Emergency stabilization and rehabilitation
Forum	The Greater Sage-grouse Range-wide Issues Forum
Forum Report	Greater Sage grouse Range-wide Conservation Issues Forum Report
FRESC	Forest Rangeland and Ecosystem Science Center
FSA	USDA Farm Services Agency
FTE	Full time equivalent
GIS	Geographic Information System
GPMZ	Great Plains Management Zone
GPS	Global Positioning System
Guidelines	Guidelines to Manage Sage-grouse Populations and their Habitats
GRSG	Greater sage-grouse <i>Centrocercus urophasianus</i>
GUSG	Gunnison sage-grouse <i>Centrocercus minimus</i>
JV	Habitat Joint Ventures
IMJV	Intermountain Joint Venture
In reach	Communication and information within agencies
INL	Idaho National Lab
IQA	The Information Quality Act (Data Quality Act)
Local Plans	Community-based Conservation Plans
LWG	Local Working Group
MOU	Memorandum of Understanding
NABCI	North American Bird Conservation Initiative
NACWC	North American Colonial Water bird Conservation Plan
NASECA	North American Sagebrush Ecosystem Conservation Act
NASECA Council	North American Sagebrush Ecosystem Conservation Act Council

NAWCA	North American Wetlands Conservation Act
NAWP	North American Waterfowl Plan
NBII	National Biological Information Infrastructure
NDOW	Nevada Division of Wildlife
NEPA	National Environmental Policy Act
NFP	National Fire Plan
NGBMZ	Northern Great Basin Management Zone
NGO's	Non-governmental organizations
NOAA	National Oceanic and Atmospheric Administrations
NRCS	USDA Natural Resources Conservation Service
O&M	Operation and Maintenance
Partners	Signatories, along with WAFWA states, to the 2000 Interagency MOU (USFWS, USFS, BLM), additionally, groups or organizations participating in sage-grouse conservation.
PECE	Policy for Evaluation of Conservation Efforts
Phase I Conservation Assessment (Assessment)	Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush. Western Association of Fish and Wildlife Agencies Unpublished Report. Cheyenne, Wyoming
Phase II (Strategy)	Greater Sage-grouse Comprehensive Conservation Strategy (this document)
PIF	Partners in Flight
PIT	Passive-integrated-transponders
PRS	Progress Reporting System
RCP	Range-wide Conservation Plan
RIEC	WAFWA Resources Information and Education Committee
S&G	Standards and Guidelines
SAGEMAP	Sagebrush and Grassland Ecosystem Map Assessment Project
SARA	Species at Risk Act
SCC	Sagebrush Conservation Council
SGBMZ	Southern Great Basin Management Zone
SGIN	WAFWA Sage-grouse Information Network
SGMZ	Sage Grouse Management Zone
SGRP	Sage-grouse Restoration Project
SOCC	Species of Conservation Concern
SPA	States, Provinces and Agencies
State/Provincial Plans	State and Provincial Conservation Strategies and Plans
Team	The Sage-grouse Conservation Planning Framework Team
Technical Committee	The Western Agencies Sage and Columbian Sharp-tailed Grouse Technical Committee
TNC	The Nature Conservancy
Tribal Plans	Tribal Conservation Strategies and Plans
U.S. Institute	U.S. Institute for Environmental Conflict Resolution
USFS	Department of Agriculture, United States Forest Service

USFWS	Department of Interior, United States Fish and Wildlife Service
USGS	US Geological Survey
USSCP	U.S. Shore bird Conservation Plan
WA	SGIN Website Administrator
WAFWA	Western Association of Fish and Wildlife Agencies
WBMZ	Wyoming Basin Management Zone
WGA	Western Governors Association
YTC	Yakima Training Center

Executive Summary



EXECUTIVE SUMMARY

“The overall goal of the Greater Sage-grouse Comprehensive Conservation Strategy (Strategy) is to maintain and enhance populations and distribution of sage-grouse by protecting and improving sagebrush habitats and ecosystems that sustain these populations. This Strategy outlines the critical need to develop the associations among local, state, provincial, tribal, and federal agencies, non-governmental organizations, and individual citizens to design and implement cooperative actions to support robust populations of sage-grouse and the landscapes and habitats upon which they depend. The justification for this effort is widespread concern for declining populations and reduced distribution of sage-grouse.

Background

Sage-grouse are currently found in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming in the United States and Alberta and Saskatchewan in Canada. The current range has been estimated to be a reduction of 44% from the historically occupied range. In addition, populations in most of the range have been demonstrated to have declined from 1965-2003, the period where data was collected most intensively. Between May 1999 and December 2003, eight petitions were filed with the U.S. Fish and Wildlife Service (USFWS) to have sage-grouse protected under provisions of the Endangered Species Act (ESA). In 2001 the USFWS determined that greater sage-grouse in the Columbia Basin of Washington state warranted protection under provisions of the ESA. In 2005 the USFWS determined that the greater sage-grouse did not warrant protection in the remainder of the range, but encouraged continued and enhanced conservation efforts. Greater sage-grouse in Canada are listed as Endangered under provisions of the Species at Risk Act (SARA).

In 1954 the Western Association of Fish and Wildlife Agencies (WAFWA) formed a technical committee to monitor the distribution and abundance of sage-grouse. WAFWA formalized a program of interstate coordination and cooperation in 1995 to address the issues of sage-grouse population losses and degradation of sagebrush ecosystems in order to: 1) *Maintain the present distribution of sage grouse* and 2) *Maintain the present abundance of sage-grouse*. In 1999 WAFWA amended the objectives to: 1) *Maintain and increase where possible the present distribution of sage grouse* and 2) *Maintain and increase where possible the present abundance of sage grouse*. The Bureau of Land Management, USFWS, and U.S. Forest Service formally joined with WAFWA in range-wide conservation efforts in 2000.

WAFWA entered into a contract with the USFWS in 2002 to produce a complete conservation assessment for greater sage-grouse and its habitat. WAFWA choose to produce the assessment in two phases: Phase I is a 2004 assessment of greater sage-grouse populations and sagebrush habitats upon which they depend (‘Assessment’, senior author J. C. Connelly; http://sagemap.wr.usgs.gov/conservation_assessment.htm) and Phase II (‘Strategy’, this document) is a conservation strategy for greater sage-grouse and

sagebrush habitats. The Assessment demonstrated that approximately 99% of the current population of greater sage-grouse is found in the United States, while the remaining 1% is located in Canada. Federal lands make up about 72% of the total range of the species making federal land management agencies primarily responsible for habitat management. However, privately owned lands provide critical seasonal habitats for many populations and their importance to conservation may greatly exceed their ownership percentage. Throughout their range, sage-grouse populations are located on lands that overlap significant natural resources such as oil and gas resources, water resources, wind power sites, mineral deposits, agricultural, and recreational areas. Sage-grouse are also found in habitats that are at significant risk of change due to exotic weeds, fire, and conifer encroachment.

In 2000 the Gunnison sage-grouse (*Centrocercus minimus*) was officially recognized as a separate species, based on morphological, genetic, and behavioral differences from the greater sage-grouse (*C. urophasianus*). This Strategy deals with greater-sage grouse, but portions of the Strategy (Chapter 6) make reference to, and are applicable to, Gunnison sage-grouse. The strategy for Gunnison sage-grouse conservation is outlined in the Gunnison Sage-grouse Range-wide Conservation Plan which is available for download at the Colorado Division of Wildlife website (<http://wildlife.state.co.us>).

Strategy Guiding Principles

The Strategy incorporates seven guiding principles: 1) Inclusion and mutual respect, 2) Local, state, agency and group initiative and leadership, 3) Commitment to monitoring and adaptive management, 4) Commitment to continued cooperation and coordination, 5) Commitment to functional and productive landscapes, 6) Inclusion of the best science and maintaining scientific integrity, and 7) Commitment to the Range-wide Issues Forum suggestion that the Strategy should strive to: a) protect what we have, b) retain what we are losing, and c) restore what has been lost.

Seven sage-grouse management zones are established based on populations within floristic provinces (detailed description in Assessment). The success of conservation actions will be judged on the basis of long-term population trends in each of the seven Management Zones. The overall goal of the range-wide Strategy is to maintain and enhance populations and distribution of sage-grouse by protecting and improving sagebrush habitats and ecosystems that sustain these populations. The overall objective of the range-wide Strategy is to produce and maintain neutral or positive trends in populations and to maintain or increase the distribution of sage-grouse in each Management Zone. Therefore, the future distribution, trend, and abundance of sage-grouse populations will be the ultimate indicators of the Strategy's success.

The Strategy is designed to augment and facilitate other conservation plans and strategies. The Strategy references local, state, provincial, and agency conservation strategies and adds regional and range-wide strategies. Local, state and provincial,

federal agency and other sage-grouse and sagebrush conservation plans are not diminished or changed by this Strategy.

Strategy Outline

The Strategy is outlined in 7 sub-strategies: 1) Conservation actions, 2) Monitoring the effectiveness of conservation actions, 3) Monitoring the implementation of conservation actions, 4) Research and technology, 5) Funding, 6) Communications, and 7) Adaptive management.

Conservation Actions:

WAFWA initiated a public process in October 2005 to develop range-wide conservation strategies to benefit greater sage-grouse. Informed and committed individuals representing a wide breadth of experience and involvement with sage-grouse across western North America were invited to participate in a series of meetings known as the Sage-grouse Forum (Forum). The goal of the Forum was to facilitate collaborative development of approaches that address issues, needs, opportunities, and partnerships related to conservation of greater sage-grouse and sagebrush habitats at the range-wide scale. Forum participants identified three essential resources needed to take the Strategy forward: 1) Funding; 2) Leadership committed to organizing, supporting and guiding a long-term effort; and 3) Appropriate organizational structure to sustain conservation actions over time.

The Strategy also involves hundreds of citizens and resource professionals with disparate backgrounds who participate in Local Working Groups scattered throughout sage-grouse range. Due to many individual circumstances, and agency personnel changes, the makeup of working groups will change over time. Therefore, consistent and reliable monitoring data must provide a common language for sage-grouse conservation temporally and spatially.

Monitoring:

The Strategy repeatedly stresses the need for appropriate types of monitoring to provide the information required to make educated decisions and to adaptively manage resources. Monitoring provides the 'currency' necessary to evaluate management decisions and to assess progress or problems. Adequate monitoring should be considered an integral and inseparable component of all management actions, and therefore, not optional. Lack of proper monitoring will undoubtedly hinder this large-scale conservation effort.

Research and Technology:

Research and technology are fundamental components of an effective conservation strategy. Research is considered here as a broad categorization of many topics including, inventory, monitoring, and evaluation of specific questions related to the

understanding or management of greater sage-grouse. Even though some monitoring and evaluation activities can be considered research, they are also important components of management and therefore are essential to the success of the Strategy.

Funding:

Funding is needed to implement conservation actions and is critical to success of the Strategy at the local, regional and range-wide level. The Funding Sub-strategy addresses two elements: funding and appropriate administrative structure. The basic premise of the Strategy is that additional conservation capacity must be developed at all levels (local, state and agency, and range-wide) for both the short-term (first 3-5 years) and for the long term. The Funding Sub-strategy proposes implementation of the North American Sagebrush Ecosystem Conservation Act (NASECA), modeled on the North American Waterfowl Management Plan, to provide funding and structure for sage-grouse conservation. WAFWA and its partners, through a broadly-based Implementation Team, will continue to provide leadership and guidance to implement the Strategy.

Communications:

WAFWA's sage-grouse conservation program is largely dependent upon groups staffed by volunteers who need continuing support through recognition of their efforts, reimbursement of out-of-pocket expenses, and continuing outreach by the states, provinces, and agencies. There is a continuing and growing need for communication of unbiased, up to date technical information to guide on-the-ground projects. This need is addressed by the Strategy through development of a consortium of conservation experts.

As sage-grouse conservation efforts move forward, there is a need for continuing communication to establish and maintain broad-based support for the Strategy. Public education, outreach, and in reach (communication within agencies and groups to increase understanding) about sage-grouse conservation can be more effective through partnerships between states, federal agencies, non-government organizations, and citizens. The Strategy has a primary message to the public that, "Greater sage-grouse and sagebrush habitats are of critical importance. The Greater Sage-grouse Comprehensive Conservation Strategy has been prepared as a roadmap for the long-term conservation of sage-grouse and their habitats and the Strategy needs your support to be successful."

Conclusion

There are three essential resources needed to ensure successful implementation of the Strategy: 1) Significant and sustained funding; 2) Leadership committed to organizing, supporting, and guiding a long-term effort; and 3) Appropriate organizational structure to sustain range-wide conservation through time. A basic premise of the Strategy is that additional conservation capacity must be developed at all levels (local, state and agency, and range-wide) for both the short-term (first 3-5 years) and for the long term. The Strategy proposes the development and implementation of the North American Sagebrush Ecosystem Conservation Act (NASECA) to provide the funding and

organizational structure needed to sustain a long-term range-wide conservation effort. WAFWA and its partners must remain strongly committed to providing the leadership and guidance needed to implement the Strategy over time.

Chapter 1

Introduction



CHAPTER 1

Introduction

Greater sage-grouse are widely considered in scientific and public arenas to be a species of significant conservation concern (Connelly and Braun 1997, Schroeder et al. 1999, Schroeder et al. 2004). In response to those concerns, states and provinces that are occupied by sage-grouse have implemented extensive conservation efforts. The U.S. Fish and Wildlife Service (USFWS) has determined that greater sage-grouse warrant protection under provisions of the Endangered Species Act (ESA) in the Columbia Basin of Washington state and do not warrant protection in the remainder of the range. (U.S. Fish and Wildlife Service, 2001, 2005) However, the USFWS 2005 “not warranted” finding for the remainder of the species’ range encouraged the continued and enhanced conservation efforts for greater sage-grouse (U.S. Fish and Wildlife Service, 2005). An ESA listing for greater sage-grouse would have serious economic, cultural and societal consequences across much of the western United States. In Canada the species is federally listed as Endangered under the Species at Risk Act (SARA).

Recognizing the risk to sage-grouse, the Western Association of Fish and Wildlife Agencies (WAFWA) began extensive conservation efforts to arrest the decline in the species and its habitat. Since these efforts began, the Gunnison Sage-grouse (*Centrocercus minimus*) has been recognized as a separate species apart from the greater sage-grouse (*Centrocercus urophasianus*). The Strategy deals principally with greater-sage grouse but portions of the Strategy (see Chapter 6 for example) make reference to, and are applicable to, Gunnison Sage-grouse. Unless otherwise noted all reference in the Strategy refer to greater sage-grouse. This strategy outlines efforts that are underway today and develops a roadmap for efforts that need to be conducted into the future and at population and range-wide scales that have not been addressed by ongoing sage-grouse and sagebrush conservation efforts. This strategy further develops a series of sub-strategies that will facilitate sage-grouse conservation at each scale. Due to history and current federal regulations (ESA for example), the Strategy focuses on greater sage-grouse but it is anticipated that the Strategy forms the basis for future planning for many sagebrush obligate and dependent species.

Background

The presettlement distribution of potential habitat for greater Sage-Grouse includes an area of currently occupy approximately 668,412 km² (258,000 mi²) of habitat in western North America (Schroeder et al. 2004). The current range of greater sage-grouse consists of approximately 56% of the estimated potential habitat available prior to European settlement (Fig.1.1) Sage-grouse are currently found in California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming in the United States and in Alberta and Saskatchewan in Canada (Schroeder et al. 2004). Approximately 99% of the current population is found in the United States, while the remaining 1% is located in Canada. Federal lands make up about 72% of the total range of the species (Connelly et al. 2004) making federal land management agencies primarily responsible for habitat management. However, privately owned lands provide critical seasonal habitats for many populations and their importance to conservation may greatly exceed the percentage of ownership within a

population's range. Throughout their range, sage-grouse populations are located on lands that overlap significant natural resources such as oil and gas resources, water resources, wind power sites, mineral deposits, agricultural and recreational areas. Sage-grouse are also found in habitats that are at significant risk of change due to exotic weeds, fire and conifer encroachment (Connelly et al. 2004).

Sage-grouse are a landscape-scale species in the sense that they are seasonally mobile and annually they often have an extremely large home range. To maintain genetic flow and opportunities for dispersal, populations need to be connected which requires large expanses of sagebrush habitat. Due to the large expanses of habitat this species require, a single population can span multiple jurisdictions. The need for connected habitats requires coordination between management authorities, private landowners and land management agencies. Conservation of the species requires that healthy populations be maintained across the range of the species.

In the early 1990s the Western States Sage and Columbian Sharp-tailed Grouse Technical Committee (Technical Committee) recognized that sage-grouse populations were declining throughout their range. In 1994, the Technical Committee reported to the WAFWA directors that sustained range-wide declines in sage-grouse numbers and distribution were occurring. The Technical Committee further expressed concern about the continuing decline in the quality and quantity of sagebrush habitat. The WAFWA directors responded by signing the first of a series of MOUs committing sage-grouse and sagebrush states to a coordinated conservation effort. The initial MOU (WAFWA, 1995) was updated in 1999 (WAFWA, 1999). Specific objectives listed in the WAFWA 1999 MOU are to:

1. Maintain and increase where possible the present distribution of sage grouse.
2. Maintain and increase where possible the present abundance of sage grouse.
3. Develop strategies using cooperative partnerships to maintain and enhance the specific habitats used by sage grouse throughout their annual cycle.
4. Conduct management experiments on a sufficient scale to demonstrate that management of habitats can stabilize and enhance sage grouse distribution and abundance.
5. Collect and analyze population and habitat data throughout the range of sage grouse for use in preparation of conservation plans.

In 2000, the WAFWA directors further committed to inter-jurisdictional coordination with the signing of an interagency sagebrush/sage-grouse conservation MOU with the United States Department of Agriculture, Forest Service (USFS), United States Department of Interior, Fish and Wildlife Service (USFWS) and the United States Department of Interior Bureau of Land Management (BLM) (WAFWA, 2000). Specific objectives of the interagency MOU are to:

1. Maintain, and increase, where possible, the present distribution of sage grouse.
2. Maintain, and increase, where possible, the present abundance of sage grouse.
3. Identify the impacts of major land uses and hunting on sage grouse, and determine the primary causes for declines in sage grouse populations.
4. Develop a Range-wide Conservation Framework to provide for cooperation and integration in the development of Conservation Plans to address conservation needs

across geographic scales as appropriate.

5. Develop partnerships with agencies, organizations, tribes, communities, individuals and private landowners to cooperatively accomplish the preceding objectives.

The 2000 Interagency MOU established the Sage-grouse Conservation Planning Framework Team (Team). The Team consists of 4 state biologists and 3 federal biologists. The Team is responsible for providing a framework for sage-grouse and sagebrush conservation planning across the range of sage-grouse and between jurisdictions within the range of sagebrush. In 2002, WAFWA signed a contract with the USFWS and assigned the team to produce a Conservation Assessment (CA) for greater sage-grouse.

The Team produced the greater Sage-grouse Conservation Assessment in two Phases: a conservation assessment and a conservation strategy. Phase I of the conservation assessment, *Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats* (Assessment), was completed and delivered to the USFWS in June 2004 (Connelly et al. 2004). Phase II of the CA is the Conservation Strategy (this document).

Strategy

The overall strategy for the management and/or conservation of greater sage-grouse is to develop the associations among local, state, provincial, tribal, and federal agencies, non-governmental organizations, and individual citizens necessary to design and implement cooperative actions to support robust populations of sage-grouse and the landscapes and habitats upon which they depend. The Strategy proposes establishment of seven biologically based sage-grouse and sagebrush management zones which typically cross jurisdictional boundaries and require continued collaboration and coordination (Figs. 1.2-1.4). This Strategy is a multi-faceted approach to greater sage-grouse conservation and is built on a foundation of 50 years of cooperation and coordination. This document contains a series of conservation issues, concerns or risks that confront the species at various scales. Development and implementation of conservation strategies and actions occurs at numerous scales including Local Working Groups (LWG), state/provincial conservation and management planning efforts, and range-wide conservation efforts involving cooperation among states, provinces, federal agencies, and any group interested in the range-wide management of sage-grouse and their habitats. Although each scale of management/conservation action tends to focus on specific areas of interest and/or relevance (i.e., LWGs tend to concentrate on conservation actions at the allotment or local area level), there is by necessity a broad area of overlap. For example, states are required by law to set the laws concerning harvest regulations, which ultimately must be incorporated into LWG and range-wide planning efforts. The identification of conservation issues is only one part of a successful conservation effort. To that end a series of sub-strategies have been identified. Sub-strategies that will facilitate the successful completion of the overall conservation strategy include:

Monitoring the implementation of conservation actions. Implementation of management and conservation activities is necessary to achieve the population and habitat goals. This sub-strategy outlines the steps necessary to monitor what conservation activities are

occurring, where they are occurring, the goals and objectives of the action and the partners involved.

Monitoring the effectiveness (outcomes) of conservation actions. Successful management will require an effective monitoring program for both sage-grouse and their habitats. The sub-strategy to monitor or to develop monitoring techniques for both sage-grouse and sagebrush habitats will provide managers and decision makers with information to evaluate the effects of treatments and conservation efforts and to adaptively manage sage-grouse conservation.

Adaptive Management. Adaptive management is an effective and important component of management. Adaptive management recognizes, and plans for, uncertainties in conservation efforts and actively proposes hypotheses that can then be tested via monitoring and recalibration of these efforts. This sub-strategy encourages the use of outcome-based management. Conservation actions as well as the administration of the conservation efforts are designed or encouraged to have pre-determined measure outcomes. The actual outcome will be evaluated against the expected outcomes and subsequent management will be adapted following the evaluation of the action.

Research needs and technology. During the last 50 years the science community has conducted research into many questions regarding sage-grouse and western rangelands. However, many important management questions remain unanswered and need to be addressed on a priority basis. In addition, this sub-strategy takes into account the need to use innovative and emerging technologies that can provide more cost effective and rigorous information.

Communication and outreach. Improved, coordinated and cooperative communication efforts will enhance support for conservation and avoid duplication of efforts. Western stakeholders value personal independence and initiative and locally-based solutions to local problems. Many urban residents of the sagebrush biome are not familiar with the complexity of the problems, opportunities and values within the sagebrush ecosystem. In the case of sagebrush and sage-grouse conservation, there is good reason to believe that a more informed public will be a more supportive and involved public; especially when people learn that individuals in their own community are actively engaged in the process.

Funding. This sub-strategy outlines a framework for short and long-term funding opportunities. Several state and local conservation plans identified hundreds of conservation actions without a funding mechanism to build capacity to successfully accomplish the outlined goals. The funding opportunities outlined in this sub-strategy, if implemented, would provide a consistent and predictable funding stream to implement this Range-wide Comprehensive Strategy as well as state and local conservation plans. The funding strategy also includes an infrastructure to encourage, coordinate and guide conservation efforts.

Guiding Principles

The overall goal of the range-wide Strategy is to maintain and enhance populations and distribution of sage-grouse by protecting and improving sagebrush habitats and ecosystems that

sustain these populations. WAFWA and its partners envision a continuation of coordinated, cooperative range-wide sage-grouse and sagebrush conservation resulting in productive sage-grouse populations and habitats that are highly valued by society as sage-grouse habitat and because of their biological, open-space, aesthetic and other intrinsic values. It is further envisioned that this will be accomplished through long-term, coordinated and cooperative efforts which welcomes all stakeholders into the process. Progress will be guided by the following principles and values (not listed in order of priority):

1. Inclusion and Mutual Respect.

All interested and affected parties, groups, individuals, and organizations (stakeholders) are welcomed as partners in achieving sage-grouse and sagebrush conservation through a process that is committed to understanding and respecting a diversity of opinions and values among stakeholders.

2. Local, State, Agency and Group Initiative and Leadership.

The principle of acting locally is the foundation of this Strategy and is fundamental to sage-grouse and sagebrush conservation. Perspectives, needs, abilities, and resources differ across the range and between the parties involved in sage-grouse and sagebrush conservation. It is important for each group and individual to be informed about range-wide goals and objectives and then to take the initiative to find and commit resources to achieve local conservation goals.

3. Commitment to Monitoring and Adaptive Management.

Progress towards long-term population and habitat distribution goals can only be evaluated if projects and activities are accurately monitored over time. It is incumbent upon all entities involved in sage-grouse and sagebrush conservation to establish goals and objectives for each activity and to establish effective monitoring programs concurrent with each project. Over time, monitoring results will provide the information needed to adapt activities, protocols and, processes to effectively and efficiently achieve established goals. It is incumbent upon all entities to not only collect monitoring information but also to then appropriately adapt programs based on monitoring data.

4. Commitment to Continued Cooperation and Coordination.

Cooperation and coordination between agencies, states, and groups has enabled unprecedented accomplishments in sage-grouse and sagebrush conservation planning. An example is the publication of the range-wide conservation status assessment. All parties involved in sage-grouse and sagebrush conservation are committed to continued cooperation and coordination and are willing to consider inclusion of new groups and organizations as full partners in conservation.

5. Functional and Productive Landscapes.

Although this Strategy is specific to sage-grouse, 350 species of flora and fauna occupy

the sagebrush ecosystem (Connelly et al. 2004). Unfortunately a high proportion of these species are endemic and imperiled species (Connelly et al. 2004). Although sage-grouse conservation is the force behind this conservation effort, the success of this effort is dependent upon the success of sagebrush ecosystem conservation. Successful sagebrush ecosystem conservation must incorporate the values and functions of all the species of flora and fauna and all ownerships, which contribute to the stability and productivity of sagebrush ecosystems. To that end, sage-grouse will serve as a surrogate species for the conservation of sagebrush ecosystems (Appendix A).

6. Best Science and Scientific Integrity.

The conservation community is the beneficiary of over 50 years of scientific inquiry dealing with sage-grouse and the relationship of sage-grouse to sagebrush systems. It is incumbent upon the implementers of this Comprehensive Strategy to use knowledge to guide conservation actions and to direct future research. Conservation efforts must be firmly based in sound science or the "Best Available Science." Conservation activities should be grounded in the use of science reported in a variety of: peer-reviewed publications (e.g., *Journal of Wildlife Management*, *Journal of Range Management*, *Ecology*, *Auk*, *Condor*, etc.) Implementation can also refer to (in descending order of precedence) dissertations and thesis, peer-reviewed papers/reports; non-peer-reviewed papers/reports and finally popular literature. Conservation efforts should be framed as a management experiment with careful collection of data and evaluation of the effectiveness of these experiments so these efforts can add to the body of science.

7. Range-wide Issues Forum

The Range-wide Issues Forum suggests that the guiding principle of sage-grouse and sagebrush conservation should be to: 1) protect what we have, 2) retain what we're losing, and 3) restore what has been lost: ranked in descending order of importance because it is easier, cheaper and success is more likely to be achieved if conservation involves protection of existing habitat and populations than it is to restore populations and habitat that have been lost.

Measures of Success

Range-wide Management

Sage-grouse conservation goals and range-wide management are guided by the delineation of sage-grouse management into seven distinct Management Zones. These Management Zones were determined by sage-grouse populations and sub-populations identified within seven floristic provinces (Fig. 1.2) (Connelly et al. 2004). Forty-one sage-grouse populations are distributed across seven floristic provinces. Greater and Gunnison sage-grouse management are encompassed in one Management Zone. (Fig.1.3). Floristic provinces (Connelly et al. 2004) were used to delineate Management Zones because they reflect ecological and biological issues and similarities, not political boundaries. In addition, the vegetation communities found in the floristic provinces, as well as the management challenges, within a Management Zones are similar and sage-grouse and their habitats are likely responding similarly

to environmental factors and management actions.

The Management Zones include:

- | | |
|-----------------------------|--|
| Management Zone I: | Great Plains Management Zone (GPMZ) <ul style="list-style-type: none">• <i>Includes the states and provinces of Montana, Wyoming, North Dakota, South Dakota, Saskatchewan, and Alberta.</i> |
| Management Zone II: | Wyoming Basin Management Zone (WBMZ) <ul style="list-style-type: none">• <i>Includes the states of Idaho, Wyoming, Utah, and Colorado</i> |
| Management Zone III: | Southern Great Basin Management Zone (SGBMZ) <ul style="list-style-type: none">• <i>Includes the states of Utah, Nevada, and California</i> |
| Management Zone IV: | SNAKE RIVER PLAIN Management Zone (SRPMZ) <ul style="list-style-type: none">• <i>Includes the states of Idaho, Utah, Nevada, and Oregon</i> |
| Management Zone V: | Northern Great Basin Management Zone (NGBMZ) <ul style="list-style-type: none">• <i>Includes the states of Oregon, California and Nevada</i> |
| Management Zone VI: | Columbia Basin Management Zone (CBMZ) <ul style="list-style-type: none">• <i>Includes only the state of Washington</i> |
| Management Zone VII: | Colorado Plateau Management Zone (CPMZ) <ul style="list-style-type: none">• <i>Includes the states of Colorado and Utah and considers greater and Gunnison sage-grouse.</i> |

Management Zones I, II, IV, and V encompass the core populations of greater sage-grouse and have the highest reported densities (Fig. 1.4) (Connelly et al. 2004). Management Zone VII includes Gunnison and greater sage-grouse. Management Zone III encompasses lower densities in the Columbian Basin while dispersed numbers exist in Management Zone VI. Gunnison sage-grouse are partitioned from small greater sage-grouse populations associated in the Colorado Plateau.

Definition of Success

Connelly et al. (2004) conducted an assessment of current population distribution and long-term maximum counts for males on active greater sage-grouse strutting grounds from 1965 – 2003 for each Floristic Province (Management Zone). Their analyses suggested significant long-term declines for 5 of the 7 Management Zones (Management Zones I, II, III, IV, and VI) (Table 1.1). The remaining 2 Management Zones (V and VII) remained statistically unchanged (Connelly et al. 2004). The Strategy treats the Assessment analysis as a reference period upon which future analyses of population trends will be compared. This reference period was selected for the following reasons: 1) this was the interval used in the analyses of Connelly et al. (2004) and as such has an established record of evaluation; 2) a broad time interval reduces the potential problems that selection of a specific and/or “unusual baseline year” would cause in future analyses; and 3) the selection of a relatively large baseline period incorporates ‘natural’ variability of populations. Therefore, the overall objective of the range-wide Strategy is to produce and maintain neutral or positive trends (Table 1.1) in populations and maintain or increase the distribution of sage-grouse in each Management Zone.

The Strategy foresees coordinated and cooperative implementation of actions within each Management Zone that will, over time, alter the slope (Table 1.1) of each Management Zone population trend line in a positive manner. Each Management Zone will define success based on the data from that zone. Definitions of success within a specific Management Zone may change over time as population monitoring techniques or management status change. As population trends within each Management Zone respond long-term success can be judged based on comparisons with data from the 1965-2003 period for that specific Management Zone.

This strategy recognizes that local and/or statewide plans may have more or less ambitious goals than this, perhaps with accompanying efforts to establish and/or expand populations to pre-1965 levels. Consequently, the overall goal of the range-wide Strategy should be considered 'minimal' and not necessarily 'optimal'. Although an optimal range-wide goal would consider population and/or distribution targets that predate the 1965-2003 reference period, there are many range-wide realities such as 'permanent' habitat loss, which would preclude this type of recovery and/or make it unrealistic on a scale this large.

Periodic assessment periods for analysis of the Strategy will occur at 5, 10, 15, 20, 25, and 30 years following publication. Periodic assessments will require an analysis of data using the same methods as Connelly et al. (2004). In addition, this Strategy encourages the use of new or more sophisticated population monitoring or trend analyses techniques developed in the future.

Gunnison sage-grouse are included in Management Zone VII, but were not used in the regression analyses provided by Connelly et al. (2004). The Gunnison Sage-grouse Range-wide Conservation Plan (RCP) offers a rationale for conservation targets for each Gunnison sage-grouse population. Recommended strategies are provided for habitat protection, habitat improvement, and population management. Local conservation targets were established by analyzing the modeled population capacity (Table 1.2). These conservation targets were accepted cooperatively by the agencies that developed the RCP.

Organization and Format

The strategy is organized into 9 chapters. Chapter 1 serves as the introduction to the Strategy and includes background information, a vision statement, a listing of guiding principles, information on organization and format and a list of acronyms used in the report. Chapter 2 summarizes community, state, agency and range-wide conservation strategies. Chapter 3 outlines strategies and protocols for effective monitoring of populations and habitat to determine the effects of conservation activities and projects. Chapter 4 deals with monitoring the implementation of conservation strategies. Chapter 5 addresses research priorities and the needs and opportunities for incorporating improved technology in sagebrush and sage-grouse conservation and management. Chapter 6 sets forth both short-term and long-term funding strategies. Chapter 7 deals with effective communication as an aid to conservation. Adaptive management protocols are discussed in Chapter 8 and the schedule for conservation activities is outlined in Chapter 9.

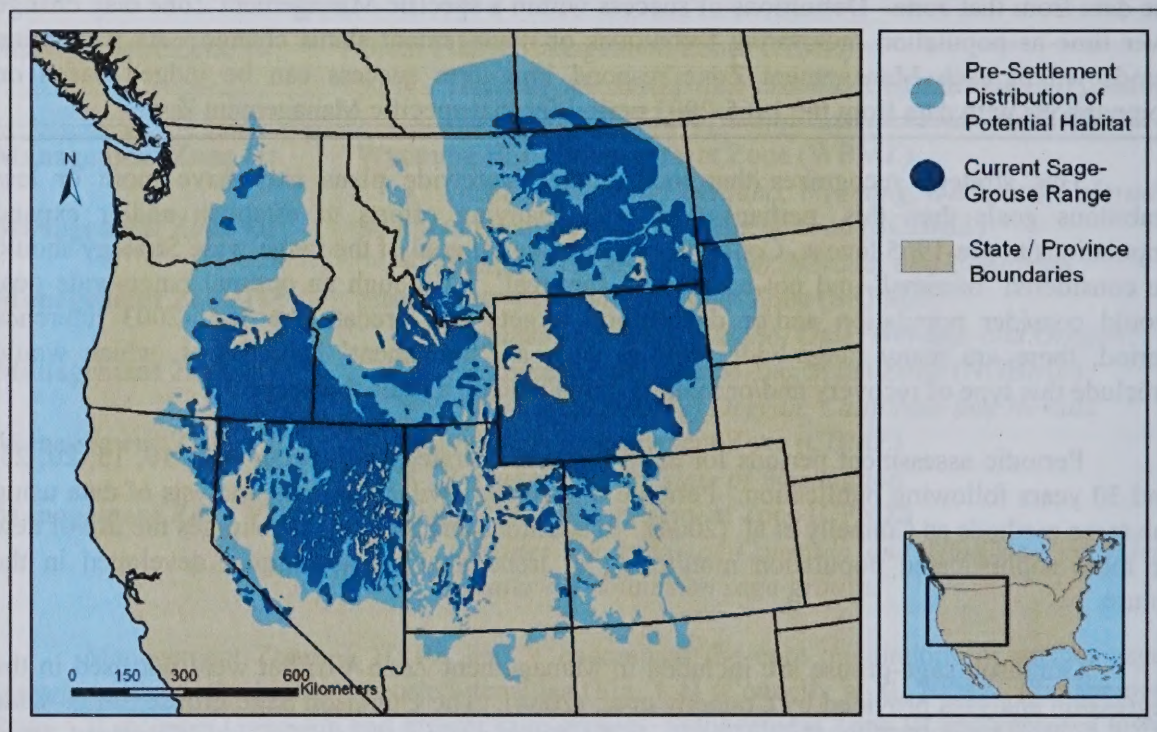


Fig. 1.1 Current distribution of sage-grouse and pre-settlement distribution of potential habitat in North America (Schroeder et al. 2004). For reference, Gunnison sage-grouse in southeastern Utah and southwestern Colorado are shown.

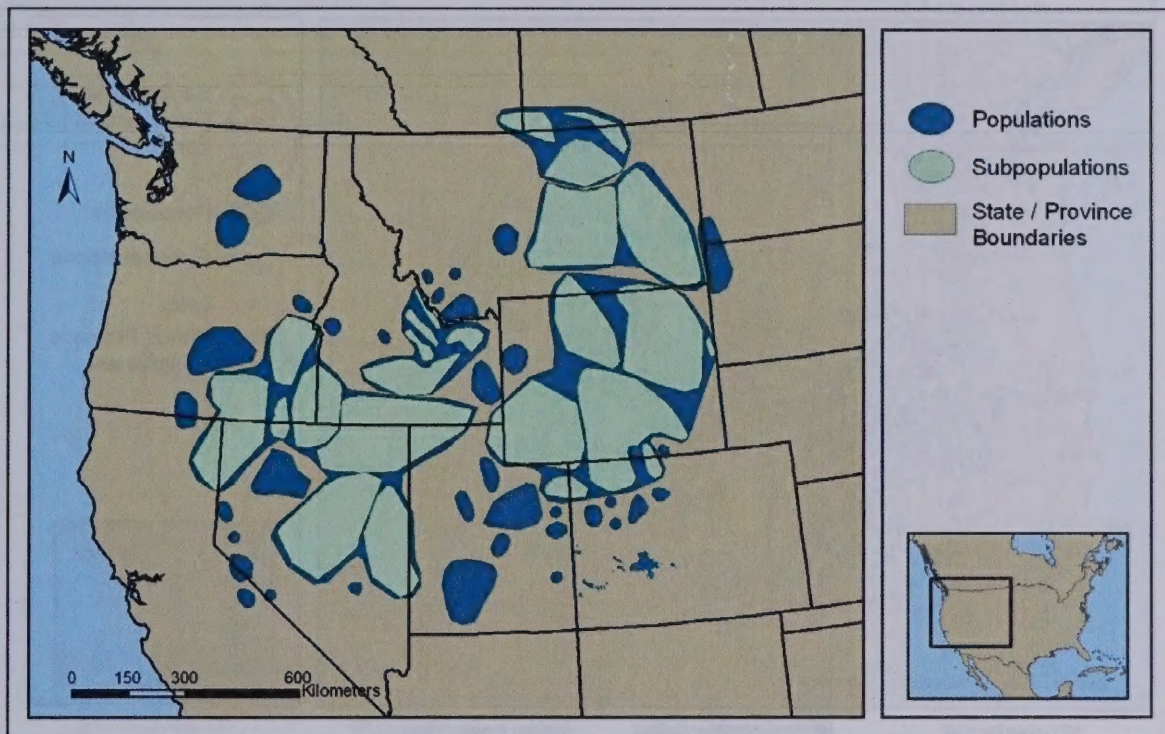


Figure 1.2. Greater sage-grouse population and subpopulations identified in Connelly et al. (2004).

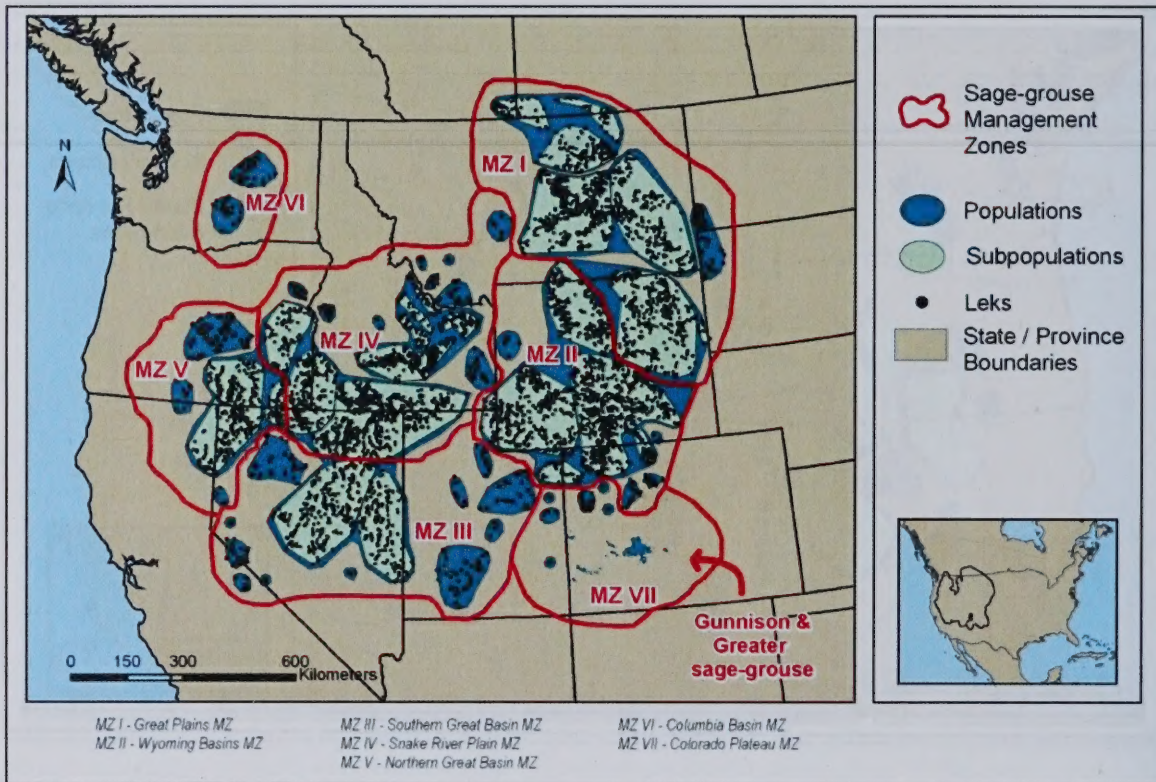


Figure 1.3. Greater and Gunnison sage-grouse Management Zones outlined in North America.

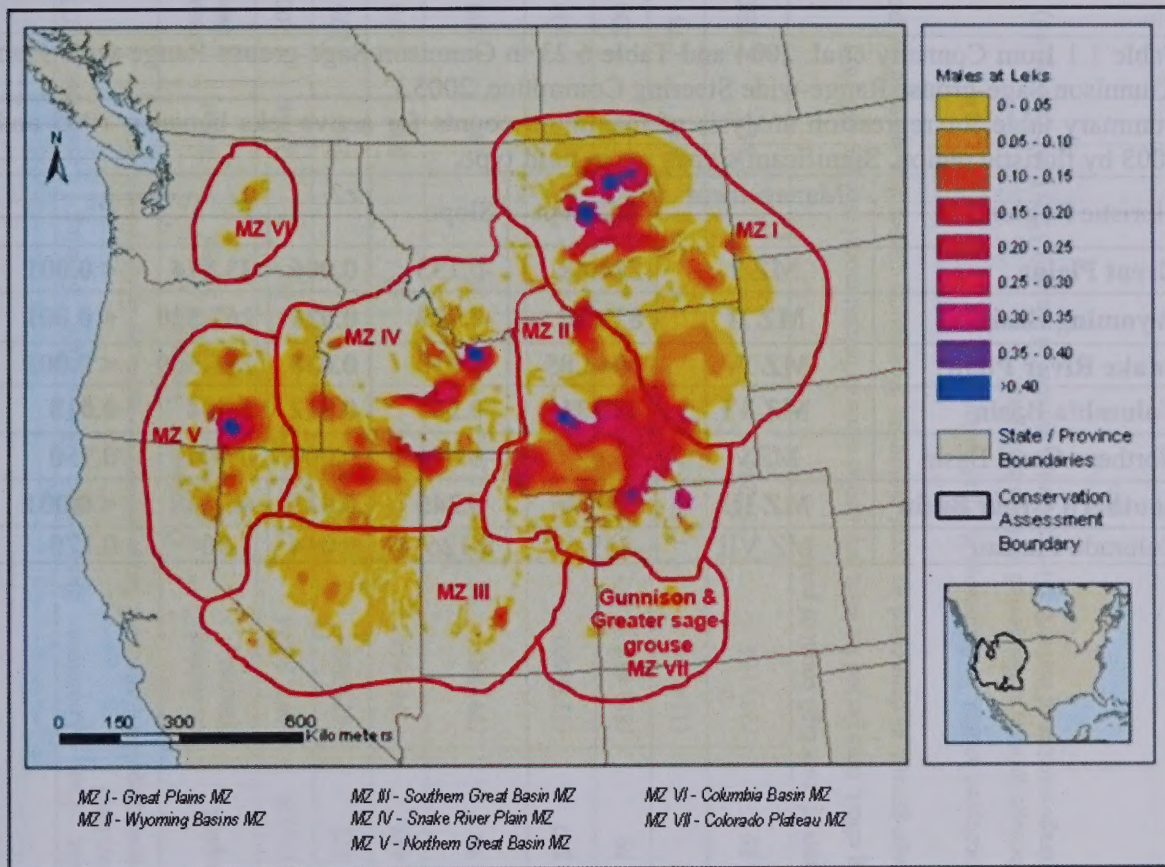


Figure 1.4. Greater and Gunnison sage-grouse Management Zones outlined in North America with associated strutting male densities.

Table 1.1 from Connelly et al. 2004 and Table 6.23 in Gunnison Sage-grouse Range-wide Plan (Gunnison Sage-grouse Range-wide Steering Committee. 2005.)

Summary table for regression analysis of maximum counts for active leks between 1965 and 2003 by floristic region. Significant slopes are in **bold** type.

Floristic Region	Management Zone	Intercept	Slope	r^2	F	P
Great Plains	MZ I	284.68	-0.133	0.006	43.174	< 0.001
Wyoming Basin	MZ II	823.28	-0.400	0.021	267.520	< 0.001
Snake River Plain	MZ IV	1042.85	-0.510	0.038	275.509	< 0.001
Columbia Basin	MZ VI	421.31	-0.201	0.012	6.404	0.018
Northern Great Basin	MZV	35.62	-0.004	0.000	0.004	0.950
Southern Great Basin	MZ III	509.30	-0.245	0.013	46.438	< 0.001
Colorado Plateau	MZ VII	-239.63	0.126	0.014	1.904	0.170

Table 1.2. Table 32 in Gunnison Sage-grouse Range-wide Plan (Gunnison Sage-grouse Range-wide Steering Committee. 2005 See <http://wildlife.state.co.us/wildlife/speciesofconcern/birds/gunnisonconsplan.htm>)
Occupied, vacant, and potential habitat, modeled population capability, recent population size, and future population target, by GUSG population.

Population	Occupied ³	Vacant ⁴	Potential ⁵	Occupied ⁶	Occupied + Vacant + Potential	Males	Total	Future Target	
Gunnison	530,464	22,879	157,240	(620) 3,039	(647) 3,174	(836) 4,099	605	2,968	3,000
Crawford	34,908	18,136	61,848	(25) 122	(47) 229	(121) 593	40	196	275
San Miguel	85,999	41,360	61,783	(86) 423	(136) 666	(210) 1,030	62	304	450
Dove Creek	26,907	52,747	237,492	(15) 75	(79) 385	(364) 1,783	30	147	200
Monticello, UT	59,579	56,824	75,285	(54) 267	(123) 602	(213) 1,045	37	182	300
Piñon Mesa	24,185	63,584	136,361	(12) 59	(88) 433	(252) 1,236	26	128	200
Poncha Pass	14,781	0	27,794	(1) 4	(1) 4	(34) 167	8	39	75
Cerro Summit - Cimarron - Sims	37,145	4,874	20,462	(28) 35	(33) 164	(58) 284	7	34	TBD

¹Estimated from regression of occupied habitat vs. population estimate derived from high count of males.

²Based on multiple-year average of lek counts with comparable sampling effort; time period for each population same as habitat model (see pp. 186-187).

³Acres of habitat within each population thought to be occupied by sage-grouse, as delineated by local biologists. Vegetation classes that are used by grouse were selected by local biologists within occupied range boundary.

⁴Acres of apparently suitable habitat that is not currently known to be occupied habitat, as delineated by local biologists.

⁵Acres of habitat that could, with intensive management, be suitable for sage-grouse, as delineated by local biologists.

⁶Population estimate converted from average of recent lek counts as: (average number of males/0.53) + [(average number of males/0.53)*(1.6)]; (see pg. 45).

Chapter 2

Conservation Planning

Sub-Strategy



CHAPTER 2

Conservation Planning Sub-Strategy

Introduction

The long-term conservation of greater sage-grouse requires the integration and implementation of several completed and on-going conservation planning efforts. This chapter outlines these key conservation planning efforts, including the results from the Range-wide Greater Sage-grouse Issues Forum. This chapter also identifies a range of options for some specific conservation needs. Specific strategies are not detailed, as local conditions will necessarily dictate workable options. However, these general strategies will assist in outlining objectives and courses of actions, and offer specific examples where available.

The Conservation Sub-strategy is comprised of multiple conservation planning documents that articulate specific actions considered necessary to conserve greater sage-grouse. These include the following:

- Community-based Conservation Plans (Local Plans)
- State and Provincial Conservation Strategies and Plans (State/Provincial Plans)
- Canadian Sage Grouse Recovery Strategy (Canadian Strategy)
- Greater Sage-grouse Range-wide Conservation Issues Forum Report (Forum Report)
- BLM National Sage-grouse Habitat Conservation Strategy (BLM Habitat Strategy)
- Tribal conservation strategies and plans (Tribal Plans)
- Facilitating Objectives

The Forum Report, BLM Habitat Strategy, Canadian Strategy and most State/Provincial Plans have been completed and are in various stages of implementation. Colorado's greater sage-grouse conservation plan is projected for completion in June 2007, South Dakota's for January 2008. Many Local Plans are still in development. Most are expected to be completed by December 31, 2008. Known completion dates for all Local Plans are shown as part of Table 2.1.

The Facilitating Objectives supplement, and are tiered to, the objectives developed by the Forum. They represent additional actions necessary to meet conservation needs, or provide additional details, that are not specified in the previous documents, or for which conservation measures still need to be identified. In this document, the Facilitating Objectives are located Appendix C3A. Each Facilitating Objective was developed using the same Issue/Problem Statement template employed in the Forum process.

Many actions described in this and the other Sub-strategies are already being implemented. Some, such as certain management framework actions set forth under Goal 1 of the BLM Habitat strategy, have already been completed. Others, particularly long-term repetitive needs such as budget development, policy coordination within and across agencies, habitat and population monitoring and evaluation, and information sharing, will be long-term

commitments. Tracking the implementation and status of all of these actions is covered in the Implementation Monitoring Sub-strategy.

Defining and Ranking Issues

Since the mid-1990s, when substantial concerns began to emerge regarding sage-grouse population trends, a spectrum of issues potentially affecting sage-grouse was identified. Subsequent analysis and planning efforts determined that, although some issues may be significant at one scale, they may not necessarily be significant at one or more other scales. Using predation as an example, some local conservation plans have identified predation as a significant threat to population persistence. However at the range-wide scale, the Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats (Connelly et al., 2004), as well as the expert panel convened by the Fish and Wildlife Service to address threats identified in ESA listing petitions, determined that predation is not a significant threat to sage-grouse. Similarly, although livestock grazing occurs throughout the range of sage-grouse, it is not possible to categorically characterize its effects on sage-grouse on a range-wide basis.

As a consequence, no attempt was made to rank the range-wide issues analyzed in the Conservation Assessment, the Forum report, nor this document. Ranking of issues identified in local and regional plans needs to be based on local data and information. However, the same issues discussed by the expert panel and detailed in the January 2005 greater sage-grouse listing decision made by the U.S. Fish and Wildlife Service were ranked in a range-wide and an East-West regional context (western - Management Zones III, IV, V, and VI and eastern - Management Zones I, II, and VII), and readers may want to review those rankings (Appendix D).

Issues that were not developed in detail by the Forum, or are not appropriate for range-wide or regional recommendations are discussed in further detail under Facilitating Objectives.

Relationship of State/Provincial Plans, Local Plans, and the Range-wide Strategies

Sage-grouse conservation planning efforts are being implemented at multiple levels (range-wide, state, and local). The variety of planning efforts and the similarity of terms used to describe these efforts have resulted in some confusion over the relationships among these efforts. The following is intended to provide some clarification.

Local Plans are the foundation for range-wide conservation of greater sage-grouse. It is through implementing the actions in Local Plans that projects and other actions of most immediate benefit to sage-grouse will accrue. State/Provincial plans provide a supporting framework that facilitates the development and implementation of Local Plans. State plans identify threats, issues, opportunities and other considerations to consider in local conservation planning and State/Provincial plans address issues and needs that cannot adequately (because of scale limitations) be considered at the local scale. Range-wide strategies address issues and needs that cannot be adequately addressed at local, state, and provincial scales, and include consideration of sub-populations, populations, and eco-regional scale issues involving more than one state or province.

Existing Conservation Strategies

Local Plans

The formalization of locally-based conservation planning had its beginnings in the 1996 sage-grouse conservation MOU among WAFWA member agencies (Appendix B), wherein one of the objectives of the MOU was to “develop strategies using cooperative partnerships to maintain and enhance the specific habitats used by sage grouse throughout their annual cycle.” Among the suggested actions in the MOU was the “development of cooperative partnerships with private, state, and federal land managers.” The cooperative partnerships objective was restated in a 1999 WAFWA MOU that strengthened 1996 MOU objectives and actions, including “continuation of the development of Conservation Plans based on the local working group concept.”

Local Plans encompass logical population or subpopulation units of sage-grouse, and generally contain site-specific provisions for managing activities and land uses within sage-grouse habitat. They provide the foundation for making decisions of the most immediate consequence to sage-grouse and their habitats at local scales. Depending upon configurations, over 50 distinct planning areas will eventually be covered by Local Plans (Table 2.1).

Local plans are primarily developed as action or tactical plans. The participants in these efforts were tasked with developing projects or conservation efforts that would address proximal conservation concerns. Therefore, although considerable strategic thinking is embedded in the local conservation efforts, strategies are not necessarily formally identified.

No formal guidelines for conducting the development of either Local Plans or State/Provincial Plans were developed under the MOU, and each WAFWA State or Province engaged in a process it felt appropriate for the task. One result of such a variable approach is that direct comparison of issues and related specific actions among plans is not always possible. (Table 2.2).

State/Provincial Plans

Like Local Plans, the range-wide development of State/Provincial Plans had its genesis in the 1996 MOU, which called for “Preparation of Conservation Plans.” Saskatchewan does not have a Provincial plan, but is operating under the provisions of the Canadian Sage Grouse Recovery Strategy and the Alberta Greater Sage-grouse Recovery Plan. Colorado and Utah have completed a Gunnison sage-grouse range-wide plan. When all State/Provincial Plans for greater sage-grouse have been completed, they will encompass all greater sage-grouse habitat within their respective State/Provincial boundaries. Because greater sage-grouse inhabit limited areas of California that are contiguous with sage-grouse habitat in Nevada, and grouse move between Nevada and California, a Bi-State plan was prepared to address the conservation needs of the bi-state populations.

Conservation strategies developed by states, provinces and local working groups are articulated in the specific plans. Table 2.2 identifies issues and corresponding plans containing strategies to address those issues.

Canadian Strategy

In July 2001, the Canadian Sage Grouse Recovery Strategy (Canadian Strategy) was released. The stated goal of the Canadian Strategy is "... to recommend measures which will enable the sage grouse population in Alberta and Saskatchewan to recover to self-sustaining levels so that the species is not threatened or endangered."

The following is excerpted from the Preface to the Canadian Strategy:

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) listed sage grouse in Canada as threatened in 1997 and, after further review, changed the status to endangered in 1998. The provinces of Saskatchewan and Alberta jointly formed a Sage Committee (RENEW) process in November 1997. The Recovery Team is composed of representatives from government (provincial and federal), land managers, landowners, conservation organizations and industry from Saskatchewan and Alberta. Although outside of the RENEW process, the Recovery Team adopted the evolving RENEW concept for development of recovery plans. This Recovery Strategy reviews the background and status of sage grouse in Canada, establishes goals and objectives and provides recommended strategies for population recovery.

Prior to release of the Canadian Strategy, the Canadian Sage Grouse Recovery Team "initiated the formation of Working Groups to develop Action Plans to convert recommended strategies into initiatives and activities directed at accomplishing recovery goals and objectives."

U. S. Federal Government Agencies

Three federal agencies, the USDI Bureau of Land Management (BLM), USDI Fish and Wildlife Service, and USDA Forest Service formally engaged in range-wide sage-grouse conservation planning efforts in 2000 by entering into a Memorandum of Understanding with WAFWA. Since 2000, the USDA Natural Resources Conservation Service, and Farm Service Agency, and USDI Geological Survey, USDI National Park Service, Department of Defense, and USDI Bureau of Reclamation have become active participants in sage-grouse conservation activities, contributing financial and technical resources. The BLM is the only federal agency that has prepared a formal strategy to address sage-grouse conservation for lands and programs it administers. However, as noted in the discussion in Chapter 5, the Conservation Reserve Program (administered by the Farm Service Agency) has been shown to be important for sage-grouse in localized areas. Given the universality of this program throughout the range of the species, this program may provide expanded conservation opportunities in the future.

BLM National Sage-grouse Habitat Conservation Strategy. The Bureau of Land Management manages over half of all remaining sagebrush habitat in North America (Figure 2.1), and slightly less than half of all remaining sage-grouse habitat. That the proportion of sagebrush and sage-grouse habitat administered by the BLM is approximately half of each is coincidental, because clearly not all sagebrush habitats are sage-grouse habitat. Geographically, sage-grouse habitats administered by the BLM span all 11 states in which greater sage-grouse occur, putting BLM in the position of having the greatest management influence throughout a substantial part of the species range. Because of having such a key role in managing sagebrush inhabited by sage-grouse, the BLM developed its National Sage-grouse Habitat Conservation Strategy to guide future actions for conserving sagebrush habitats, and to enhance BLM's ongoing conservation efforts.

The BLM Habitat Strategy was issued in November 2004, and provides for conservation efforts by setting out broad goals and specific actions to meet the goals. Integral to the BLM Habitat Strategy are guidance documents to help ensure that sage-grouse conservation measures are incorporated into all ongoing BLM programs and activities, including land use planning, grazing, mineral leasing, and other programs.

The BLM Habitat Strategy articulates four main goals. Each goal specifies tiered strategies and actions the BLM will take to meet the goal. The four goals are:

- 1) Improve the effectiveness of the management framework for addressing conservation needs of sage-grouse on lands administered by the BLM.
- 2) Increase understanding of resource conditions in order to prioritize habitat maintenance and restoration.
- 3) Expand partnerships, available research and information that support effective management of sage-grouse habitat.
- 4) Ensure leadership and resources are adequate to continue ongoing conservation efforts and implement national and state-level sage-grouse habitat conservation strategies and/or plans.

In addition to meeting internal management and administration needs, many products resulting from the BLM Habitat Strategy have much broader application for sagebrush and therefore sage-grouse conservation, generally, and are the result of partnership endeavors. Examples include broad and mid-scale mapping of sagebrush communities, ecoregional assessments, procedures for describing sage-grouse habitat at multiple scales, and best management practices (BMP) for managing resource use and development in sage-grouse habitats.

The BLM Habitat Strategy notes that effective conservation strategies must occur at a variety of scales, with a variety of partners (state, local and tribal governments), and be integrated into the daily activities of the BLM land management mission. It recognizes that

sagebrush conservation requires national level policy, national and local program commitment, and local and regional knowledge and support. Annually, the BLM reviews progress being made in implementing the strategy and uses the information in support of budget development, work planning, and accomplishments reporting.

Tribal Strategies

Tribal participation in the sage-grouse conservation effort has been encouraged since the formation of the first local conservation working groups. Tribal participation was originally envisioned through participation and coordination with local working groups and with the state and provincial planning groups. The various tribes with sage-grouse resources have participated to varying degrees in these efforts, based upon individual tribal interests. Some tribes have participated in the formal LWG process and state or provincial processes but have interest in developing their own sage-grouse conservation plans. At the present time WAFWA is not aware of any tribe specific plans that have been completed. However several tribes have working drafts and are in the process of having these plans endorsed by their respective governments.

Native American participation in the overall sage-grouse planning effort has been significant. Tribal and individual perspectives regarding sage-grouse transcend basic demographic values and encompass deeply held cultural and historical values.

Greater Sage-grouse Range-wide Issues Forum

The Greater Sage-grouse Range-wide Issues Forum (Forum) was convened in November 2005 to facilitate collaborative approaches in addressing issues, needs, opportunities, strategies and partnerships related to the conservation of greater sage-grouse and sagebrush habitats at the range-wide scale. The Forum was sponsored by the Western Association of Fish and Wildlife Agencies.

In an effort to ensure the Forum was neutral and impartial, and to facilitate effective interaction among a diverse representation of stakeholder interests, WAFWA contracted with the U.S. Institute for Environmental Conflict Resolution (U.S. Institute) to organize and convene the Forum. The U.S. Institute is an independent federal agency that assists parties in resolving environmental, natural resource, and public lands conflicts through assisted negotiation and mediation. A Forum Facilitation Team comprised of the U.S. Institute's Dr. Larry Fisher and Susan Hayman, of North Country Resources, Inc., designed, facilitated, and documented the Forum process.

Thirty-five people were selected by the Facilitation Team to participate in the Forum process, representing the broad array of perspectives related to greater sage-grouse conservation. Participants were chosen based on their experience, background, and knowledge of greater sage-grouse conservation issues, their interest and willingness to participate in this intense process, and their ability to work collaboratively and constructively in developing strategies to address range-wide issues. Participants were not selected to be formal representatives of individual organizations or constituencies, and were not expected to be official signatories to the Forum

report or recommendations. However it was understood that, throughout the Forum process, participants were expected to provide ongoing communication and exchange of information and ideas with people or groups that share similar interests

The Forum deliberations addressed greater sage-grouse and related sagebrush habitat issues at the range-wide scale, dealing with issues at scales that cannot be adequately addressed at local, state, and provincial scales. By definition for this process, the range-wide scale may include sub-population, population, and eco-regional scales when these scales involve multiple jurisdictions. The Forum's range-wide findings are consistent with, and may be informative to, conservation actions identified in the other plans, described above. The Forum report in its entirety can be found in Appendix C.

Defining Range-wide Issues

Once the issue categories and the sub-issues within them were identified by Forum participants, work groups for each issue category were established. Forum work groups developed problem statements for each sub-issue that helped define the scope of the issue for strategy development. Range-wide strategies developed by work groups included, to the extent possible, desired conditions, goals, objectives, implementation, and monitoring information. Preliminary draft strategies were vetted with all Forum participants and refined as appropriate within the allotted time. A summary of the issues addressed by the work groups follows (also see the complete Forum Report, Appendix C and Appendix C2). To facilitate working through the long list of sub-issues identified as potential concerns, the Forum grouped the sub-issues into separate categories. Although several sub-issues spanned more than one category, all facets of the sub-issue are discussed. As an example, fire was addressed under habitat restoration, but the impacts of fire suppression were also considered.

Habitat Conservation and Land Use. Greater sage-grouse currently occupy approximately 56 percent of the historically occupied range of the species (Connelly et al. 2004). The loss of 44 percent of greater sage-grouse range and the fragmentation/habitat degradation of remaining range poses great challenges for the perpetuation of the species.

Sub-issues identified by the Forum:

- Conservation and protection of habitats.
- Invasive plant species.
- Livestock grazing.
- Agricultural lands.
- Fences.
- Surface hydrology.
- Energy corridors.
- Roads and railroads.
- Tall structures (e.g., transmission lines, wind turbines, communication towers, etc.).
- Urban/exurban development.
- Dispersed recreation.
- Non-renewable energy (including oil, gas, coal-bed methane, geothermal, and metallic and non-metallic minerals)

Habitat Restoration. Critical elements of the effort to ensure continued existence of greater sage-grouse are the conservation of important habitat and the technical capability of reliably restoring degraded habitat. This capability includes not only ecologically sound treatment techniques and management practices, but also the production and availability of genetically appropriate plant materials.

Sub-issues identified by the Forum:

- Conifer encroachment.
- Range-wide habitat restoration assessment and planning.
- Native seed availability.
- Planting expertise.
- Fire.

Science, Data Management, and Information. The *Conservation Assessment* and the *12-Month Finding* identified numerous instances where lack of definitions, data and metrics pose great difficulties for identifying greater sage-grouse needs and ways to recover their habitat and populations. In addition to the lack of data and information, there is currently no mechanism for efficiently housing and distributing information among the many agencies, organizations, and individuals involved in greater sage-grouse conservation.

Sub-issues:

- Standardized vegetation and other data layer base map and access system.
- Definition of success for greater sage-grouse conservation.
- Evaluating social and economic effects of human activities on greater sage-grouse and habitat persistence.
- Ability to predict population outcomes/habitat as a result of vegetation change.
- Range-wide research and monitoring collaboration and coordination.

Regulatory Mechanisms. It may be difficult to effectively implement conservation actions for greater sage-grouse due to inconsistent and inadequate application of regulations within and among agencies. Emerging science also suggests that some regulations result in unforeseen or unwanted impacts on greater sage-grouse and their habitat (e.g., regulations that address specific habitat desired conditions or methods to achieve them). Incentive-based conservation solutions are limited.

Sub-issues:

- Inconsistent and inadequate application of existing regulations and policies.
- Adequacy of regulations.

Integration and Coordination across Range and Jurisdictions. Lack of coordination of policies, programs and regulations to address issues related to greater sage-grouse within and among agencies at national, regional, state, and local levels has adversely affected greater sage-grouse conservation. Current approaches do not facilitate coordinated planning, and implementation and evaluation of plans that integrate the issues and address cumulative effects. There are currently insufficient opportunities to share scientific findings, management information, and lessons learned among local working groups and other greater sage-grouse

stakeholders. This condition could impede implementation of actions that benefit greater sage-grouse.

Sub-issues:

- Current approaches.
- Insufficient opportunities to share scientific and management information and learning among local working groups and other sage-grouse stakeholders.
- Inconsistency in policy and coordination across jurisdictional boundaries.

Forum Identification of Critical Needs

A six-member “Integration Team” comprised of a diverse set of volunteers from the Forum helped synthesize the extensive output from the working groups and identify highest priority actions. The Integration Team identified seven goals as high priority/critical needs for the immediate investment of resources range-wide:

- Create long-term shared leadership and commitment resulting in implementation and evaluation of plans that integrate greater sage-grouse conservation actions throughout the range.
- Locate and protect important and/or intact greater sage-grouse habitats (“save the best”)
- Identify locations of priority areas on which to focus conservation actions to maintain the function of sagebrush ecosystems (“retain what we’re losing”).
- Institutionalize and expand long term existing natural resource information portals (e.g., SAGEMAP) for greater sage-grouse and sagebrush ecosystems to provide easy and dependable access to useful information. The information should include vegetation, land cover, land-use, infrastructure, habitat change, wildlife habitat, greater sage-grouse information, surface geology and hydrology data, guidelines, techniques, best management practices, and other critical data and information for greater sage-grouse and sagebrush conservation through an accessible central repository.
- Develop and implement a coordinated program of research and monitoring projects integrated within the context of the landscape. Monitoring efforts should address the effects of human activities and natural events on greater sage-grouse and sagebrush habitat. Monitoring results can then provide the foundation for adaptive management.
- Develop and implement grazing systems and management practices that maintain the soil quality and ecological processes necessary for a properly functioning sagebrush community to address long-term needs of greater sage-grouse and other sagebrush associated species.
- Create a mechanism for sharing information among LWGs and all levels of those involved in sage-grouse conservation to enable measurement of cumulative effects on sage-grouse habitats.

Additional goals were identified as regionally important for the western (Management Zones III, IV, V, and VI) and eastern (Management Zones I, II, and VII) regions of the range, respectively.

West

- Contain and suppress wildfires in important greater sage-grouse habitats.
- Manage dispersed recreational activities to avoid, reduce and, where possible, eliminate displacement of greater sage-grouse or negative impacts to greater sage-grouse habitat.
- Identify known locations, and areas of future risk, for the top priority invasive plant species.

East

- Provide for non-renewable resource development and utilization with the assurance of 'no net loss' of sagebrush habitat or greater sage-grouse populations at appropriate spatial and temporal scales.
- Develop and use consistent criteria and management guidelines to locate/site, energy corridors, and operate and maintain new and existing facilities within energy corridors in a manner that minimizes impacts to greater sage-grouse and sagebrush habitat.
- Develop and implement technologies and practices that offset, reduce and/or minimize disturbance to greater sage-grouse and their habitat associated with non-renewable resource recovery activities.
- Develop and implement best management practices and appropriate mitigation measures that can be implemented for siting and operation and maintenance activities associated with energy corridors.

The Forum participants finally identified three essential resources needed to take this work forward: (1) funding, (2) leadership committed to organizing, supporting and guiding a long-term effort, and (3) the appropriate organizational structure to sustain it.

Forum participants agreed that the first critical step was to request the Western Governor's Association (WGA) and appropriate federal, state, and local agency heads with budget authority to include significant funding for greater sage-grouse strategy implementation in their 2008 budgets. Members of the forum independently contacted the WGA and appropriate agency leaders and requested that funds be allocated, in the next budget cycle, for sage-grouse conservation efforts identified by the forum. The second critical step toward successful implementation of a range-wide strategy for greater sage-grouse is to establish an executive committee of federal, state, and local agency heads who have the authority to make decisions regarding allocation of resources for strategy implementation, such as funding, personnel and priorities. Lastly, the third critical step is to convene, on a regular basis, a group of

representatives of diverse interests to provide counsel and advice to the executive committee regarding strategy implementation.

Unresolved Conservation Issues

Information about these issues provided by the Conservation Assessment was an important factor in the Forum's decision to not develop more in-depth recommendations to address the following issues. Given the complexity and variability of these issues across the range of greater sage-grouse, range-wide prescriptions for these issues cannot be developed. However, the following information is presented as a tool to increase understanding of these issues, and to direct users of these documents to on-going efforts and references that will facilitate the development of local plans.

As with all land management activities, regardless of land ownership, project planning needs to consider the local, landscape and cumulative effects of those activities on sage-grouse and sagebrush habitats. Early project planning should consider not only the amount of habitat affected, but changes to habitat quality, resulting fragmentation (if any), impacts to seasonal habitats and migratory pathways, effects of human presence and structures, noise levels, and other relevant considerations, with every effort made to design the project so as to minimize these impacts to the species and its habitat. Once designed, these project specifications must be enforced to realize any benefit to the species. Although project planning efforts and implementation, including compliance enforcement, will likely be a local responsibility, in many cases it will be appropriate to consider both the short and long-term impacts and effects of projects at larger scales, including the management zone level.

Reclamation of sagebrush habitats is an important component of this strategy. For clarity, reclamation is defined here to mean returning disturbed sagebrush habitats to a condition that will sustain sage-grouse populations either year-round or seasonally, as appropriate. Although an overall prescription for reclamation cannot be made here because soil types, weather patterns, topography, and other factors will dictate reclamation procedures and timing, several general principles can be identified here, such as the need to develop and provide a mechanism for distribution of native seed mixes, and sharing of technical information in reclamation practices. Some of these reclamation issues are shared with habitat restoration issues (e.g. seed sources for restoration of sagebrush after a large wildfire), and associated potential solutions are identified in the Range-wide Forum Report (Appendix C).

Energy Development:

Impacts of energy development were identified in the Conservation Assessment (Connelly et al. 2004). Data collected and made available to WAFWA since the release of the Conservation Assessment provides further information and are briefly summarized here. More detailed information is provided in Chapter 5, and the following referenced publications. Sage-grouse near natural gas fields moved twice as far as birds from undeveloped leks in search of undisturbed nesting habitat (Lyon and Anderson 2003), and nest initiation rates were lower. Unlike nests in disturbed landscapes (Lyon and Anderson 2003), distributions of sage-grouse

nests in areas free of gas development were spatially related to lek location (Holloran and Anderson 2005). Closely spaced nests had lower success than isolated nests, suggesting that predation risk decreases the quality of otherwise suitable habitat when birds are forced to crowd nests into smaller areas to avoid energy development (Holloran and Anderson 2005). Male lek attendance decreased with distance to the nearest drilling rig (Holloran 2005). Male lek attendance also decreased as traffic volume from energy development increased. Number of males also declined when the lek was located downwind from a drilling rig, indicating that noise from energy development was likely a contributing factor. An analysis of male lek attendance rates suggests that extirpation of leks near energy development is the result of avoidance and decreased survival (Holloran 2005). In areas being developed for coal-bed natural gas, adjacent or concurrent leks showed lower population trends than leks with minimal or no development (Naugle et al. 2006a). Data analyses also indicated that sage-grouse in otherwise suitable winter habitat avoid energy development.

The above summarized information suggests that current temporal strategies to mitigate impacts of coal-bed natural gas development on wintering sage-grouse populations, and potentially breeding and nesting birds, may not be sufficient. Re-consideration of temporal strategies may be appropriate if supported by local information. Also, spatially explicit habitat prioritization tools that were produced in Naugle et al. (2006b), when coupled with local knowledge of bird movement and active lek locations, can provide a biological basis for decision-makers to formulate an effective conservation strategy for sage-grouse in areas undergoing energy development. Precluding development in refugia of identified and connected seasonal habitats may also present a viable strategy. As more information becomes available regarding the specific mechanisms affecting sage-grouse survival and productivity in and around energy development are identified, it should be incorporated into design of mitigation measures for greater sage-grouse.

Issue: Conserving sage-grouse populations in areas of energy development while continuing research to better understand effects of energy development on greater sage-grouse and sagebrush habitats		
Objective: Implement measures to protect greater sage-grouse and sagebrush habitats while facilitating research to better determine short- and long-term impacts of energy development on the species and its habitats.		
Conservation Strategy	Who (lead agency is in bold)	When
Utilize the most current scientifically-credible information available to develop and implement protective stipulations	WAFWA , BLM, USFS, State land agencies, NGO's, private landowners, local working groups	Ongoing
When making energy leasing and development decisions, utilize local greater sage-grouse information to assist in identifying areas to be	BLM	Immediately

protected from development		
Encourage and support future research on impacts of energy development on greater sage-grouse and apply adaptive management as appropriate	WAFWA, BLM, USFS, USFWS, NGO's, local working groups	Immediately
Encourage and support future research on habitat reclamation for greater sage-grouse, including seed mix development, for habitats affected by energy development and apply adaptive management as appropriate	WAFWA, USGS, BLM, USFWS, State wildlife agencies, Cooperative extension offices,	Immediately

Hunting:

Since greater sage-grouse are under the management of state wildlife agencies hunting seasons are established independently in each state. The potential impacts of hunting on greater sage-grouse populations are discussed in the Conservation Assessment (Connelly et al. 2004). In general, hunting is not considered an additive mortality factor in areas where habitat is of sufficient quality and quantity. However, hunting may be additive where habitat is limited or degraded, or where other factors are limiting the population (e.g. West Nile virus outbreak). However, the determination on whether hunting should continue within a population must be made on a local level using biological data. The reader should reference the discussion in the Conservation Assessment for further detail.

Issue: Hunting should be managed to be a compensatory and not an additive source of mortality		
Objective: Identify where hunting should be restricted based on local population and/or habitat data		
Conservation Strategy	Who (lead agency is in bold)	When
Using local data, evaluate hunting strategies to determine if the resulting mortality and wounding losses are additive or compensatory to the populations. Apply adaptive management as needed based on these assessments.	State Wildlife Agencies, WAFWA	Ongoing

Livestock Grazing:

As detailed in the Conservation Assessment (Connelly et al. 2004), there are no definitive data that summarize the effects of livestock grazing on greater sage-grouse or sagebrush habitats on a range-wide basis. Regional effects vary according soil types, precipitation zones, elevation,

etc., and local analyses of impacts must include stocking rates, type of livestock, season of use, grazing system, presence and use of an area by wild ungulates and wild horses, etc. Therefore, strategies for addressing potential affects of grazing on greater sage-grouse must be developed at the regional, and perhaps more effectively, local levels (and coordinated regionally).

One regional strategy that may provide a useful reference is the current and on-going development of grazing best management practices (BMPs), by the Western Association of Fish and Wildlife Agencies (WAFWA) and the Bureau of Land Management (BLM). The presentation of this information here does not imply endorsement of specific BMPs, but rather is presented as a potential tool that may be adapted for local purposes.

WAFWA and the BLM have agreed to work collaboratively in efforts to promote healthy rangelands and support both robust sage-grouse populations and sustainable livestock grazing. Because habitat conditions and land use issues may vary greatly in different regions of the west, sage-grouse managers decided that information would be more applicable if synthesized by ecoregion of floristic zones matching the sage-grouse management zones in the Strategy. The pilot project for this initiative is the Wyoming Basin and Southern Rocky Mountains ecoregions and was adapted from the Wyoming Basins Ecoregional Assessment study area and corresponds to Management Zone 2 in the Strategy (Figure xx). This area includes portions of Wyoming, Colorado, Utah, Idaho and Montana. The Wyoming Basin – Southern Rocky Mountains was chosen because it contains several large populations of sage-grouse. The pilot project area includes sagebrush communities and other areas within seasonal sage-grouse ranges across the ecoregion. These efforts are proposed to be expanded to the rest of the range of sage-grouse pending the success of this project. Primary cooperators in this effort include the Western Association of Wildlife Agencies, the Bureau of Land Management, and the Wyoming Department of Agriculture.

A literature review of livestock grazing effects in sagebrush ecosystems has been developed by the BLM National Science and Technology Center (NSTC) and will serve as the basis for a synthesis of the information for the Wyoming Basin and Southern Rocky Mountains to support sage-grouse conservation. The technical document will identify a menu of options for vegetation and grazing treatments grouped by seasonal habitat components for sage-grouse. The goal of the project is to consider livestock impacts on sagebrush ecosystems and associated livestock management actions, as identified in the literature, and provide reference tools that local working groups and land managers can utilize when making grazing recommendations to maintain and improve sage-grouse habitats, including riparian and upland areas. When completed, the synthesis and reference tool will be available to sage-grouse local working groups, wildlife managers, range managers and other land managers to assist in developing grazing management recommendations and in the case of landowners, voluntary grazing management actions.

A local effort being implemented by the State of Colorado within the range of the Gunnison sage-grouse incorporates creative grazing practices with the cooperation of both private and federal land managers. The effort is through a Candidate Conservation Agreement with Assurances (CCAA), and allows private landowners to incorporate conservation measures

for Gunnison sage-grouse. These conservation measures are being carried to federal grazing leases via a Memorandum of Understanding between the BLM and private ranchers.

Issue: Livestock grazing impacts on sage-grouse habitat are not uniform across the range of greater sage-grouse and reflect local livestock grazing practices.		
Objective: Develop recommended livestock grazing practices that can maintain and enhance sage-grouse habitat and that reflect, as appropriate, local and regional concerns.		
Conservation Strategy	Who (lead agency is in bold)	When
Utilize the most current scientifically-credible information available to develop and implement livestock grazing practices that reflect local and regional conditions.	WAFWA , BLM, USFS, State agricultural and land management agencies (including extension offices), NGO's, private landowners, local working groups	Ongoing
Conduct research to further understand the effects of livestock grazing practices on sage-grouse habitats. Apply adaptive management as needed.	WAFWA , BLM, USFS, State agricultural and land management agencies (including extension offices), NGO's, private landowners, local working groups	Continuing

Incorporation of Private Lands into Conservation Efforts

Private land assurances, such as CCAAs, provided through the U.S. Fish and Wildlife Service (USFWS) present another option in developing efforts for greater sage-grouse where conservation on adjacent, intertwined, or otherwise connected lands and seasonal habitats is necessary to local population conservation. A CCAA is a voluntary agreement between USFWS and a non-Federal landowner. Through the CCAA development process conservation actions are identified to ensure a "net conservation benefit" to the species in question. In many, if not most cases a landowner's normal activities are incorporated into the CCAA agreement. If a species addressed under a CCAA is ever listed under the Endangered Species Act (ESA), the landowner's land use practices are not subject to ESA regulation as long as the agreement is in place. However, the CCAA program is a good mechanism to provide a landowner an incentive for sustaining or engaging proactive on-the-ground conservation actions on their property. Despite its name, a CCAA can be developed for those species which are not currently candidates for listing under ESA, but which are at risk throughout all or part's of its range. The legal mechanism by which a CCAA works is a Section 10 permit under ESA. Such a permit documents how a landowner is legally protected, or excepted, from ESA regulation.

An "umbrella" approach may be used to develop a CCAA. This provides for one group, such as a state agency or a conservation district, for example to hold the Section 10 permit, with the permit holder, not the Service, signing up landowners under their permit. This has been done successfully with other species. The advantages of this umbrella approach are that: (1) the Service processes the necessary legal and internal and public review documentation only once,

(2) the landowner is exposed to a relatively small amount of bureaucracy and the agreement and process is relatively straightforward and simple.

All of the examples detailed above emphasize the need for strong coordination and communication between private, state and federal partners. Development of partnerships and good lines of communication between all affected parties are essential for the success of any conservation effort, and should be the first step in developing these regional and local strategies.

Issue: There is an incomplete suite of incentive and other mechanisms for conserving sage-grouse on private lands.		
Objective: In cooperation with private landowners, local working groups and others, develop additional incentives and other mechanisms that promote sage-grouse conservation on private lands.		
Conservation Strategy	Who (lead agency is in bold)	When
Establish sage-grouse habitat conservation as a priority for CRP programs	USDA, FSA	2007
Explore other options for conserving sage-grouse and sagebrush habitats on private lands, such as conservation easements with willing landowners, etc.	State wildlife agencies, County extension offices, Conservation Districts	Immediately and ongoing

Issue: There is a substantial lack of knowledge of existing mechanisms for conserving sage-grouse on private lands		
Objective: Increase private landowner and local working group awareness of existing options for conserving sage-grouse on private lands.		
Conservation Strategy	Who (lead agency is in bold)	When
Through a variety of mechanisms, including printed materials, electronic media, personal contacts, and workshops, increase private landowner and agency personnel knowledge about existing conservation options for private lands	USFWS, USDA-FSA	Immediately
Explore and develop opportunities for developing CCAA's on private lands for sage-grouse conservation	WAFWA, USFWS	Initiate in 2007

Emerging Conservation Issues

The sage-grouse conservation partnerships that have developed conservation plans and efforts to conserve the species have considered a broad array of issues that affect population growth and distribution. Most of the issues identified have strategies to mitigate the negative effects of the issues. However, some issues have yet to be discovered, impacts unknown or underestimated or will emerge in the future. Examples of emerging threats include the spread of West Nile virus into sage-grouse habitat and the unknown impact of the current strain of bird flu on the species. Strategies must be developed that will address issues in a timely manner; depending upon the immediacy of the issue. The Forum recommended that WAFWA's Sage and Columbian Sharp-tailed grouse Technical Committee and Management Zone Teams to develop a process to address emerging risks to sage-grouse and sagebrush habitats, including alternatives for addressing risks that pose an immediate threat and risks that can be addressed in a structured review.

Recommendation for Off-Site Mitigation:

Off-site mitigation for greater sage-grouse is widely and consistently discussed across the species range as an option where land uses will likely result in any loss of sage-grouse habitat, regardless of whether the loss is short-term or permanent. This Conservation Strategy recommends that a range-wide off-site mitigation policy be developed and consistently applied using the following outline.

Off-site mitigation should occur within the same population area and within the state or province where the impact is realized due to the difficulty of re-establishing self-sustaining populations once they are extirpated (Reese and Connelly 1997) and state and provincial wildlife conservation laws. Additionally, losses of entire populations may result in the loss of genetic information that may not be re-captured through re-introductions from other areas (Oyler-McCance et al. 2005). Off-site mitigation should be focused on improving existing areas, and not simply protecting existing "refugia". Once the affected land area has been reclaimed to the point of supporting all seasonal needs of the local grouse population, additional lands may be developed. However, it is essential that this not occur before the successful reclamation and re-population of that reclamation. However, on a case by case basis, a state or provincial wildlife agency may choose to apply mitigation within state but out of population area when the state or provincial agency determines that a decision to apply mitigation out of population is in the best interest of sage-grouse.

If adequate refugia cannot be accomplished within an existing sage-grouse population area, then off-site mitigation should occur within the same Management Zone in which the affected population occurs. In this situation, mitigation should occur either geographically if the success of population re-establishment is the greatest and genetics are not an issue, or genetically if that is an important issue.

Off-site mitigation should not occur outside the management zone from which the affected population occurs due to the concern with genetic issues, and the recommendation of no net loss of habitat, as recommended by the Forum.

Translocations for management purposes may cross management zone boundaries when they are determined to be in conformance with prairie grouse translocation guidelines developed under the Facilitating Objective in this Strategy for such guidelines (Appendix C3A, Integration and Coordination Across Range and Jurisdictions, Current approaches, Facilitating Objective 1.2). The goal of translocation efforts should be to produce viable and free-ranging populations that require minimal long-term management intervention (IUCN 1998). There generally are three basic types of translocations; population introduction, population reestablishment, and population augmentation (IUCN 1998, Prairie Grouse Technical Council 1999). Population introduction refers to the placement of individuals outside their historical distribution, but within appropriate habitat. This has been tried in the past, but it is not a recommended strategy for prairie grouse. The only exception to this would potentially be when there is no remaining habitat left within a species' historical range (IUCN 1998). Although some of these introductions outside the historical distributions were deliberate, some were accidental (e.g., greater sage-grouse into the range of Gunnison sage-grouse in Utah and New Mexico; Reese and Connelly 1997). A more subtle variation of this type of introduction is the translocation of individuals of one subspecies into the range of a different subspecies. This type of translocation is generally not recommended (Benedict et al. 2003, Palkovacs et al. 2004).

The most common type of translocation is an effort to reestablish a population in a formerly occupied portion of a species' historical range (Rodgers 1992). Although this type of effort appears self-explanatory, it is not always simple to determine the extent of a species' historical range (Schroeder et al. 2004) or whether a species is actually absent from an area prior to the translocation. From a mitigation perspective, this would certainly offer some potential for expanding the range of sage-grouse into currently unoccupied areas.

The third type of translocation is augmentation of existing populations. There are different reasons to augment a population with one of the more common reasons being to address the adverse effects of genetic drift in relatively small and isolated populations (Bouzat et al. 1998; Westemeier et al. 1998; Bellinger et al. 2003; Bouzat et al. 2005a, b; Olyler-McCance et al. 2005). It is also possible that population augmentations could be used to bring small populations up to a threshold level where breeding success is sufficient to compensate for adverse stochastic events that can drive a small population to extinction.

Figure 2.1. Land ownership within occupied sage-grouse range.

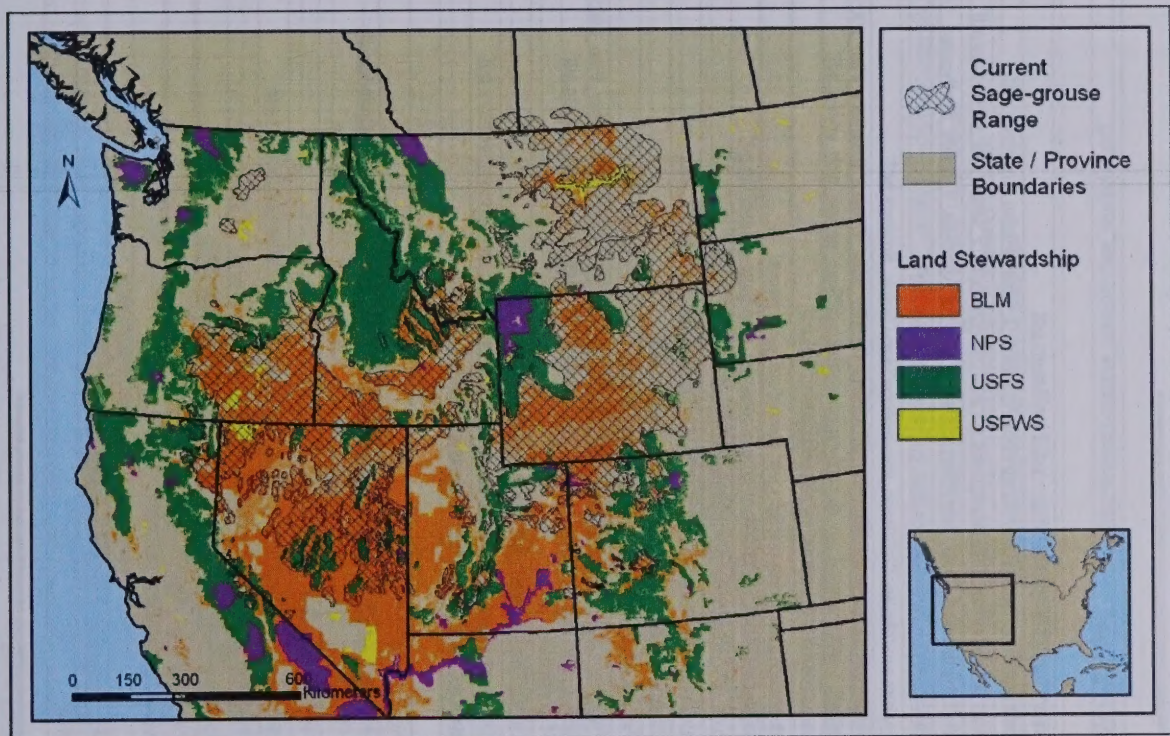


Table 2.1. Status of Planning Efforts and Conservation Plans.

Planning Group	State Province	Species	Initiation	Completion	Reference Location
Range-wide Forum	All	GRSG	2005	2006	Forum Report: http://sagegrouse.ecr.gov/pdf/FinalReport.pdf
Range-wide Forum	All	GRSG	2005	2006	Forum Strategies: http://sagegrouse.ecr.gov/pdf/Appendix_2_Final_Forum_Strategies.pdf
Range-wide Forum	All	GRSG	2005	2006	Forum Goals & Objectives: http://sagegrouse.ecr.gov/pdf/Appendix_3_Goals_and_Objectives.pdf
Range-wide Forum	All	GRSG	2005	2006	Forum Rated Synthesized Goals: http://sagegrouse.ecr.gov/pdf/Appendix_4_Rated_Synthesized_Goals.pdf
Canada	AB	GRSG		2001	http://www.srd.gov.ab.ca/fw/speciesatrisk/pdf/sagegrouseplan.pdf
BLM	All	Both	2004	2004	http://www.blm.gov/nhp/spotlight/sage_grouse/docs/Sage-Grouse_Strategy.pdf
Alberta	AB	GRSG	2002	2005	http://www.srd.gov.ab.ca/fw/speciesatrisk/pdf/Alberta_Greater_Sage_Grouse_Recovery_Plan_2005-2010_final.pdf http://www.srd.gov.ab.ca/fw/speciesatrisk/pdf/Sage_grouse_web_update.pdf
California	CA		2001	2004	http://ndow.org/wild/conservation/sg/plan/SGPlan063004.pdf
Colorado	CO		2006	2007	Plan not complete
Idaho	ID		2004	2006	http://fishandgame.idaho.gov/cms/hunt/grouse/conserv_plan/Sage-grousePlan.pdf
Montana	MT			2005	http://fwpp.mt.gov/fwppaperapps/wildthings/SGFinalPlan.pdf
Nevada	NV		2000	2004	http://ndow.org/wild/conservation/sg/plan/SGPlan063004.pdf
North Dakota	ND		2004	2005	http://gf.nd.gov/conservation/docs/sage-gr-entire-plan.pdf
Oregon	OR		2004	2005	http://www.dfw.state.or.us/wildlife/sagegrouse/pdf/sage_grouse_plan.pdf
Saskatchewan	SK			2005	http://www.srd.gov.ab.ca/fw/speciesatrisk/pdf/Alberta_Greater_Sage_Grouse_Recovery_Plan_2005-2010_final.pdf http://www.srd.gov.ab.ca/fw/speciesatrisk/pdf/Sage_grouse_web_update.pdf
South Dakota	SD		2004		Plan not complete
Utah	UT			2002	http://www.wildlife.utah.gov/uplandgame/pdf/2002manplan.pdf
Washington	WA			2004	http://wdfw.wa.gov/wlm/diversity/soc/recovery/sage_grouse/final_sage_grouse_recovery.pdf
Wyoming	WY		2000	2003	http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse.asp
Baker	OR				Organizing, Prioritizing projects
Bates Hole Shirley Basin	WY		2004	2006	http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse/BatesHoleShirleyBasin/index.asp
Big Desert	ID			2008	Group to form by Sep 2006
Big Horn Basin	WY		2004	2007	http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse/BigHornBasin/index.asp
Bi-State	CA		2002	2004	http://ndow.org/wild/conservation/sg/plan/SGPlan063004_L.pdf
Bi-State	NV		2002	2004	http://ndow.org/wild/conservation/sg/plan/SGPlan063004_L.pdf
Burns	OR				Organizing, Prioritizing projects
Cache/East Box Elder	UT			2006	http://www.cnr.usu.edu/cbcp/cache.htm
Castle Country	UT		2005	2006	http://www.cnr.usu.edu/cbcp/carbon_emery.htm
Challis	ID			2006	Writing plan

Planning Group	State Province	Species	Initiation	Completion	Reference Location
Color Country	UT		2001	2006	http://www.cnr.usu.edu/cbcp/color.htm
Crawford	CO			1998	http://wildlife.state.co.us/NR/rdonlyres/72278533-3174-4DC4-94E1-04AD72CF421E/0/GunnisonSageGrouseLocalPlan_Crawford.pdf
Curlew	ID			2006	Draft plan ready for approval
Dillon	MT			2005	Working from MT State Conservation Plan; Identifying local issues
Dove Creek	CO			1998	http://wildlife.state.co.us/NR/rdonlyres/955AD064-5E76-4936-AEBE-A7F76B229A57/0/GunnisonSageGrouseLocalPlan_DoveCreek.pdf
Duck Valley Indian Reservation	ID,NV		2001	2006	Plan approved by Tribal Council
East Idaho Uplands	ID			2008	Group to form by Sep 2006
East Magic Valley	ID			2008	Group to form by Sep 2006
Foster Creek Conservation District	WA		2000	2007	A draft will be available soon, http://www.fostercreek.net/hcpmain.html
Garfield and Rio Blanco County	CO	GRSG			
Glasgow	MT	GRSG		2005	Working from MT State Conservation Plan; Identifying local issues
Gunnison Basin	CO	GUSG		1997	http://wildlife.state.co.us/NR/rdonlyres/30FDBAF5-1C11-48F9-A797-9827CA6181CF/0/GunnisonSageGrouseLocalPlan_GunnisonBasin.pdf
Jackson Hole	WY	GRSG	2004	2007	http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse/JacksonHole/index.asp
Jarbridge	ID	GRSG		2006	Draft plan ready for approval
Lakeview	OR	GRSG			Organizing, Prioritizing projects
Lincoln	NV	GRSG	2001	2004	http://www.nevadawildlife.org/wild/conservation/sg/lwp/draft_plan070103.pdf
Middle Park	CO	GRSG	1999	2001	http://wildlife.state.co.us/NR/rdonlyres/1C7D89E6-E34A-4199-ADB9-C0AE7A2D79D8/0/MiddlePark.pdf
Miles City/Forsyth	MT	GRSG		2005	Working from MT State Conservation Plan; Identifying local issues
Morgan/Summit	UT	GRSG	2005	2006	http://www.cnr.usu.edu/cbcp/morgan_summit.htm
Mountain Home	ID	GRSG		2008	Group to form by April 2006
NE NV Stewardship	NV	GRSG	2001	2004	http://www.nevadawildlife.org/wild/conservation/sg/ne/elkostrategy.pdf
North Park	CO	GRSG	1998	2001	http://wildlife.state.co.us/NR/rdonlyres/7036F69D-F480-45C9-A6EC-4008066E40B1/0/NorthPark.pdf
North-Central	NV	GRSG	2001	2004	http://www.nevadawildlife.org/wild/conservation/sg/nc/pmu/eastrange/071403plan.pdf
Northeast	WY	GRSG	2004	2006	http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse/Northeast/index.asp
Northern Eagle Southern Routt	CO	GRSG	1998	2004	http://wildlife.state.co.us/NR/rdonlyres/5B7987D0-AA69-4C66-84C6-45E16B11E5F2/0/Eagle_SoRoutt.pdf
Northwest	CO	GRSG	1996	2006	
Owyhee	ID		1995	2005	http://fishandgame.idaho.gov/cms/hunt/grouse/conservation/owyhee_workplan.pdf

Planning Group	State Province	Species	Initiation	Completion	Reference Location
Parker Mountain	UT	GRSG	1998	2006	http://www.cnr.usu.edu/cbcp/assets/pdf/PARMdraftplan.doc
Piceance, Parachute, Roan	CO	GUSG	2006	2006	Planning in progress
Pinon Mesa	CO	GUSG		2000	http://wildlife.state.co.us/NR/rdonlyres/7A010669-C9FE-4AB1-86BD-AEB65BA1795D/0/GunnisonSageGrouseLocalPlan_PinonMesa.pdf
Poncha Pass	CO	GUSG		2000	http://wildlife.state.co.us/NR/rdonlyres/A62D53B9-A23B-46F5-B981-39A9AE020D0A/0/GunnisonSageGrouseLocalPlan_PonchaPass.pdf
Prineville	OR	GRSG			Organizing, Prioritizing projects
Rich County	UT	GRSG		2006	http://www.cnr.usu.edu/cbcp/rich.htm
San Juan	UT	GUSG	1996	2000	http://www.wildlife.utah.gov/uplandgame/pdf/gsgcp.pdf
San Miguel Basin	CO	GUSG		1998	http://wildlife.state.co.us/NR/rdonlyres/B19BA1CA-4B4C-489D-8542-8CF41FD271B3/0/GunnisonSageGrouseLocalPlan_SanMiguelBasin.pdf
Shoshone Basin	ID	GRSG		2006	Draft plan ready for approval
So. Magic Valley	ID	GRSG		2008	Group to form by Sep 2006
South-Central	NV	GRSG	2001	2004	http://www.nevadawildlife.org/wild/conservation/sg/meetings/index.shtml#sc
South-Central	WY	GRSG	2004	2007	http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse/SouthCentral/index.asp
Southwest Desert	UT	GRSG	2003	2006	http://www.cnr.usu.edu/cbcp/southwest.htm
Southwest Wyoming	WY	GRSG		2007	http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse/SouthWest/index.asp
Strawberry Valley	UT	GRSG	2003	2006	http://www.cnr.usu.edu/cbcp/assets/pdf/SVARM_final_draft_plan.pdf
Uintah Basin	UT	GRSG	2003	2006	http://www.cnr.usu.edu/cbcp/assets/pdf/ubarmsagrplan.pdf
Upper Green River	WY	GRSG	2004	2007	http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse/UpperGreenRiver/Index.asp
Upper Snake	ID	GRSG		2006	Draft plan ready for approval
Vale	OR	GRSG			Organizing, Prioritizing projects
Washoe/Modoc	CA	GRSG	2001	2004	http://www.nevadawildlife.org/wild/conservation/sg/meetings/index.shtml#wm ; Plans by PMU
Washoe/Modoc	NV	GRSG	2001	2004	http://www.nevadawildlife.org/wild/conservation/sg/meetings/index.shtml#wm ; Plans by PMU
West Box Elder	UT	GRSG		2006	http://www.cnr.usu.edu/cbcp/box_elder.htm
West Central	ID	GRSG		2007	Writing plan
West Desert	UT	GRSG	2003	2006	http://www.cnr.usu.edu/cbcp/west_desert.htm
West Magic Valley	ID	GRSG		2008	Group forming Apr 2006
White Pine	NV	GRSG	2001	2004	http://www.nevadawildlife.org/wild/conservation/sg/lwp/draft_plan070103.pdf
Wind River – Sweet River Basin	WY	GRSG	2004	2007	http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse/WindRiversweetwater/index.asp

Table 2.2 Sage-grouse conservation issues by plan

Table 2.2: Summary of issues addressed in completed State greater sage-grouse conservation plans as of September 01, 2006. Plans completed since that date may be accessed through the greater sage-grouse working group locator (<http://greatbasin.nbii.gov/lwg/index.asp>) If a state is not listed under an issue, it did not address/discuss the issue. The column labeled "Plan includes strategy to address issue" indicates whether or not the plan provided specific items to address issues (yes), or provided general guidance/discussion only (no). (NV 1 – Washoe, Lassen, Modoc; NV 2 – Elko County; NV 3 – North Central; NV 4 - White Pine; NV 5 - South Central; NV 6 - Lincoln; NV 7 - NV Bi-State Plan; NV 8 - NV/CA Plan; CO 1 - North Park; CO 2 - Middle Park; CO 3 – Eagle & South Routt).

Issue	Sub-Issue	Identified in Conservation Plan	Plan includes strategy for issue
Habitat Loss	General	NV 1, NV 3	Yes
		NV 2, WY, CO 3	No
	Allow no net loss	UT, OR	Yes
		NV 7, WA, MT	No
	Changing Land Uses	NV 3, CO 1	Yes
		NV 2, NV 5, NV 7, NV 8, WA	No
	Mining	NV 1, NV 3	Yes
		NV 2, NV 5, NV 7	No
Habitat Degradation	Urban expansion	WY, ID, OR, CO 3	Yes
		NV 1, NV 7,	No
	Water development	NV 4, CO 3	No
	Agricultural impacts	WY, ID	Yes
		WA, UT	No
	Conversion - conifer encroachment	NV 1, NV 3, NV 4, NV 6, CO 2, MT, ID, OR, CO 3	Yes
		NV 2, NV 5, NV 7, WY, UT, WA	No
	Conversion - loss of seasonal habitats	NV 1, NV 3, CO 2, CO 3, WY	Yes
		NV 2, NV 5, WA	No
	Conversion - temporary	NV 1	Yes
	Fences	NV 1, CO 2, WY	Yes
		NV 4, NV 6, NV 7, NV 8, WA, ND	No
	Fire	NV 1, NV 3, WY, UT, MT, OR, ID, CO 3	Yes
		NV 2 NV 4, NV 5, NV 6, NV 7, NV 8, WA, ND	No
	Lack of Fire	NV 1, NV 3, NV 4, NV 6	Yes
	Fragmentation	NV 1	Yes
		NV 2, NV 4, NV 5, NV 7, NV 8, WY, OR, UT	No
	Grazing	NV 1, NV 3, NV 6, CO 1, CO 2, CO 3, WY, WA, MT, OR	Yes
		NV 2, NV 4, NV 7, NV 8, ND, ID, UT	No
	Insect suppression of forbs	NV 4, NV 5, NV 6	No
	Lack of water	NV 4, NV 6, NV 7, CO 2	Yes
		UT	No

Issue	Sub-Issue	Identified in Conservation Plan	Plan includes strategy for issue
Habitat Degradation (continued)	Loss of habitat function	NV 1 , CO 2 , CO 3 , ND	Yes
		NV 7 , WY	No
	Mineral/Energy development	WY , MT , ND , ID	Yes
		WA , AB UT	No
	Noxious weeds	NV 1 , NV 3 , CO 2 , WY , MT , ND , OR , ID	Yes
		NV 2 , NV 4 , NV 5 , NV 6 , NV 7 , WA , CO 3	No
	Railroads	ID	No
	Range improvements	NV 1 , NV 3 , NV 7 , CO 1 , OR	Yes
		WY	No
	Roads	NV 1 , NV 3 , CO 1 , CO 2 , MT , ND , ID	Yes
		NV 4 , NV 7 , NV 8 , WA , OR	No
	Sagebrush control	NV 1 , OR , UT	Yes
		WA	No
	Transmission lines	NV 1 , MT , ND , ID , OR , CO 1 , CO 3	Yes
		NV 6 , NV 7 , NV 8 , WA	No
	Wild horse management	NV 3 , WA	Yes
		NV 1 , NV 2 , NV 4 , NV 6 , NV 7 , NV 8 , WY , OR	No
	Wild ungulate competition	CO 2 , UT , OR	Yes
		NV 6 , NV 7 , WY , WA , MT	No
	Windpower development	MT , OR , WA	Yes
		NV 3 , NV 4 , NV 6 , NV 7 , ID	No
Disturbance	Aerial gunning for predators	NV 1	Yes
	Dispersed recreation	NV 1 , CO 1 , CO 2 , CO 3 , WY , MT , OR	Yes
		NV 2 , NV 4 , NV 5 , NV 6 , NV 7 , WA , ND , ID	No
	Increased human access	NV 5	No
	Increased predator attraction		Yes
		NV 1	
		NV 2 , NV 5	No
		NV 1 , NV 3 , CO 1 , CO 3 , WY , WA , UT , MT , ND , OR , ID	Yes
	Lek viewing		
	Military activities/impacts	NV 3 , WA	Yes
		ID	No
	OHV use	NV 1 , NV 3 , OR , ID	Yes
		NV 4 , NV 5 , NV 6 , NV 7	No
	Private land activities	NV 3	Yes
		NV 4 , WA	No

	Road kill	NV 1, ID	Yes
Issue	Sub-Issue	Identified in Conservation Plan	Plan includes strategy for issue
Habitat acquisition/ easements			Yes
		CO 1, CO 2, UT WA	No
Habitat enhancement/ maintenance			Yes
		NV 3, CO 1, CO 2, WY, UT, OR AB	No
Habitat mitigation		NV 3	Yes
		CO 1, NV 2	No
Habitat restoration	General	NV 3, NV 7, CO 1, CO 2, WY, UT, ID NV 4, NV 6, WA	No
	Restore connectivity	NV 3, CO 2, CO 3	Yes
	Encourage restoration on Federal lands	NV 6, UT	No
Hunting		NV 3, CO 1, CO 2, CO 3, WY, UT, MT, ND, ID, OR	Yes
		NV 1, NV 5, NV 2, NV 6, NV 7, NV 8, AB, WA	No
	Poaching	NV 1, NV 6, NV 7, NV 8	No
Predation		NV 3, NV 6, CO 1, CO 2, CO 3, WY, MT, ND, ID, OR	Yes
		NV 4, NV 7, NV 8, UT	No
Disease		NV 2, NV 7, NV 8, WY, UT, OR, ID, CO 3	No
Regulatory needs	Identify limiting regulations regarding habitat restoration	NV 3	Yes
	Address grouse at early NEPA stages	NV 3 NV 4	Yes
	Lack of data for good decisions	NV 7	No
	Incorporate sage-grouse needs at planning stage	CO 1	No
Adaptive Management	Implement	CO 2	Yes
Climate change		ID	Yes
		NV 2, NV 7, NV 8	No
Life history	Population cycles	NV 2, NV 5, NV 7, NV 8	No
	Low population numbers	NV 5, AB, ID	No
	Genetic diversity	NV 1, NV 6, NV 7, WA	Yes
		WA	No
	Monitor population status	OR, ID	Yes

Pesticides		NV 3, NV 7, WY, UT, ID	Yes
		WA, NV 1, NV 8, MT, ND, CO 3	No
Issue	Sub-Issue	Identified in Conservation Plan	Plan includes strategy for issue
Population enhancement	Translocations	WA, OR	Yes
		NV 4, AB	No
	Work with Native Americans	NV 4	No
Private Lands	Habitat management on private lands	CO 2, UT, ND	Yes
		NV 6, WA	No
Public Education	Value of resource	NV 3, CO 1, CO 2, CO 3, WA, UT, MT, ND, OR	Yes
		NV 4, NV 6, NV 7, AB	No
	Source of impacts	NV 3, NV 7, CO 1, CO 2, CO 3, WA, UT, ND, OR	Yes
		NV 4, NV 6, AB	No
	Education of Federal employees	CO 1, CO 3, WA, UT	Yes
		NV 4, NV 6	Yes
Research needs	Lack of information on existing habitats	NV 3, NV 6, CO 2, CO 3, WY, UT	Yes
		NV 4, NV 7	No
	Lack of population information	NV 3, NV 6, NV 7, NV 8, CO 1, CO 2, CO 3, UT	Yes
		NV 4, WA	No
	Cost effective rehabilitation of habitats	NV 3, UT	Yes
	Population/habitat monitoring	CO 1, WY, UT, NV 8, NV 4, WA	Yes
		WA	No
	Captive breeding	CO 1	Yes
Sagebrush obligates	Incorporate into management plan for grouse	CO 2, UT, OR	Yes
		CO 2, UT, OR	Yes
Weather	Drought	WY, UT, NV 8, CO 2	No
Work with Native Americans	Habitat management	NV 1, NV 6, NV 7, UT	No

Chapter 3

Monitoring

Conservation Actions



CHAPTER 3

Monitoring Conservation Actions

Introduction

The distribution, trend, and abundance of sage-grouse populations are the ultimate indicators of success of the conservation strategies presented in this document. Therefore, reliable and comparable methods for estimating populations are critical to evaluate effectiveness of conservation actions implemented across the landscape. The importance of monitoring sage-grouse populations and sagebrush habitats cannot be overemphasized. Monitoring will provide the data needed to measure the long term success of the greater sage-grouse Comprehensive Conservation Strategy and will provide the basis for adapting management and adopting techniques to take advantage of newly acquired information. Monitoring data will answer the future questions of why we were successful or unsuccessful in our conservation efforts and how do we sustain that success.

Monitoring is a key component of adaptive management (Walters 1986), requiring repeated measures of sage-grouse populations that provide reliable information for evaluation and possible alteration of tactical actions to meet desired management objectives. Two factors that complicate the monitoring of sage-grouse and their habitats are time and distance. Sage-grouse range over large landscapes which often include multiple jurisdictions. Sagebrush ranges, absent manipulation or fire, tend to change slowly over a period of decades and, if disturbed, sage ranges are relatively slow to respond or recover. Changes in sagebrush ranges may be so subtle and slow that they are overlooked. The Strategy is based on a process that involves hundreds of citizens with disparate backgrounds, resource professionals who may or may not be involved next year and who likely will be replaced by the next decade when the final results of a project need to be evaluated and processes adapted and on data that will be measured in multiple jurisdictions. Consistent and reliable, monitoring data must provide a common language over time and space.

Sage-grouse are resident species in each of the states and provinces and each state and province has ultimate responsibility for the conservation of sage-grouse within its jurisdiction. However, over 70% of all sagebrush rangeland is owned or managed by federal agencies with a variety of management goals. There is a long history of communication and cooperation among jurisdictions responsible for sage-grouse and their habitats. However, there has not been a coordinated conservation effort across the range of the species prior to this Strategy. Although some level of consistency in sage-grouse monitoring has been achieved, the conservation assessment points out the fact that there are still problems of consistency in methods and efforts that need to be addressed (Connelly et al. 2004). A range-wide strategy also offers opportunities to develop and implement new protocols and new and better technologies in monitoring both grouse and their habitats.

This chapter discusses monitoring approaches for greater sage-grouse populations and habitats. Sage-grouse populations and habitats have been studied for many years, and the literature is relatively rich for this species. The Conservation Assessment of Greater Sage-

Grouse and Sagebrush Habitats (Connelly et al. 2004) summarize limiting factors for both populations and habitats. The variables used to address population performance and habitat quality used in the assessment form a logical basis for assessment and monitoring.

In 2005, the Western Sage-grouse and Columbian Sharp-Tailed Grouse Technical Committee organized a sub-committee to develop or update protocols for assessing greater sage-grouse populations. Also in 2005, the Bureau of Land Management began a process to identify appropriate habitat features for assessing and monitoring sage-grouse habitats at multiple scales. These protocols will be the means by which sage-grouse and their habitats are evaluated and monitored across the species range. Ultimately, a primary goal is to link habitat changes to vital population metrics (e.g. population size and trend), though the development of such models may take several years.

Monitoring Sage-grouse Populations

Background

Concern over the status and trend of greater sage-grouse populations dates to at least the early 1900s (Hornaday 1916). In the decades that followed, numerous other investigators voiced similar concerns (Girard 1937, Patterson 1952, Rogers 1964, Autenrieth 1981) and sage-grouse hunting seasons were often curtailed because of fears that populations were low (Autenrieth 1981). Because of these concerns, biologists began to develop systematic monitoring techniques to assess population trends of sage-grouse. The purpose of this section is to review common population analysis methods for sage-grouse and discuss the efficacy of these with the understanding that a more formal population monitoring strategy is currently being developed. State agencies have the responsibility to collect and analyze population data. However, coordination with land management agencies plays an important role in this monitoring.

Lek data. For more than 50 years, sage-grouse breeding populations have been monitored across the species' range by counting the number of males attending leks during the breeding season (Connelly et al. 2003). Unfortunately, early monitoring efforts were not uniform and different techniques were often employed by various agencies, making comparisons among areas and agencies difficult. Sage-grouse populations are currently monitored separately by 11 states and 2 provinces. Although lek data are collected in all states and provinces, the quantity and quality of the data differs among agencies and inferences are made about populations using a variety of methods and analyses (Connelly et al. 2004), hence population assessments across the species range are difficult to discern.

Wing data. In addition to lek count data, information has been collected from hunter-harvested birds for more than 50 years (Connelly et al. 2004) in many states. Most states have hunting seasons for sage-grouse and thus monitor harvest of the species. As with lek counts, individual efforts for collection and analysis of wing data are employed by each state. Various techniques are used to collect harvest data and in the process, wings from harvested birds are often collected, providing information on the age and sex composition of the harvest. These data are used to estimate production. The number of successfully nesting females is also often

determined based on primary feather molt sequence (Connelly et al. 2003). Obviously, this method is not suitable for populations that are not hunted or are hunted later in the fall (Wyoming) when wing feather molt is advanced and differences in successful/unsuccessful nesters can not be reliably determined. Brood surveys are still used in some areas where hunting sage-grouse is restricted, and there is a need to estimate production. Brood surveys were a popular method for estimating annual production of sage-grouse historically. However, most states do not collect this information any more, preferring the use of wing data (Connelly et al. 2003, Connelly et al. 2004). Brood surveys may also be useful for delineating brood-rearing habitat, which is an important consideration for land use and project planning.

Radio-telemetry data. Radio-transmitters have been used to mark individual sage-grouse for more than 30 years (Connelly et al. 2003). Radio-marked birds are used to monitor seasonal ranges, population demographics, and habitat use/selection. Demographic parameters of survival and reproduction are often related to habitat conditions in order to determine fitness of grouse to their habitats. Although quite useful, these types of studies typically involve small sample sizes and because demographic rates are naturally variable, interpretation of fitness can be difficult in the short term. Additionally, radio-telemetry was recently quite useful in determining the impacts of West Nile Virus to sage-grouse in portions of their range (Naugle et al. 2005, Naugle et al. 2004, Walker et al. 2004).

Banding Data. Leg bands are usually attached to captured sage-grouse (Connelly et al. 2003). Serial numbered aluminum leg bands are most commonly used to mark grouse as a method of identifying individual birds when they recovered or recaptured. Colored leg bands have also been used to allow identification of individual birds in the field. Such methodology has been useful particularly in studying lek attendance when the bands can be seen, but has limited value because sage-grouse are often found in heavy cover (Connelly et al. 2003). Some studies have used banding data to estimate movements, survival, and harvest rates (Zablan et al. 2003). Banding data could also be used to estimate population size if enough birds are marked and recaptured, but relatively large sample sizes have largely precluded the use of such techniques (Connelly et al. 2003). Radio-telemetry data has been the preferred method of studying sage-grouse populations to date. However, ongoing work in Nevada is investigating the usefulness of band data in a long term study of sage grouse populations and harvest (J. Sedinger pers. commun.).

Genetics. Recently, information regarding genetics has been collected and there is some indication that individuals can be identified through DNA sampling. Genetic-based population analysis techniques have great promise in the future. More research is needed in this area and as discussed in Chapter 5.

Current Approaches: Strengths and Limitations

Male Lek Attendance. Current monitoring for greater sage-grouse populations provides information useful at local, regional (typically states or provinces), and range-wide scales. However, most monitoring programs are not designed at a scale broader than states or provinces. Connelly et al. (2004) were able to draw inferences about sage-grouse population trends range-wide by using data regarding lek attendance, which is collected throughout the species' range.

These data use the common theme of male attendance at leks, but they are gathered with differing methodologies, producing various biases in interpretation of population trends.

Batterson and Morse (1948) and Patterson (1952) popularized the use of lek attendance as a basis for population monitoring based on the belief that male sage-grouse regularly attend leks during the breeding season. Later research supported these methods, demonstrating that most male sage-grouse attend leks sometime during the breeding season, and that peak male attendance lagged behind peak female attendance by 3-5 weeks with most birds on leks around sunrise (Jenni and Hartzler 1978, Emmons and Braun 1984). Based on this information, the authors suggested that peak numbers of males can be estimated to within 90% with 3-4 counts between ½ hour before and 1 ½ hours after sunrise 3-5 weeks after the peak of breeding.

Patterson's (1952) method for monitoring of leks remains the basic model for estimating population trend used today. Connelly et al. (2003, 2004) described the main types of lek monitoring methods currently being conducted, including lek surveys, lek counts, and lek censuses. Most states and provinces use combinations of all of these methods (Connelly et al. 2004).

Lek Surveys. Lek surveys are the most basic form of lek monitoring, whereby lek locations are opportunistically identified and monitored over time for activity, typically classified as active or inactive in a given year. Emmons and Braun (1984) indicated that the number of active leks increases with an increasing population, suggesting that knowledge of the number of leks may be the most useful information to track population trends. However, because this method does not involve quantification of the size of individual leks, it may be less sensitive than other lek counting techniques -particularly to short-term changes in population size (Connelly et al. 2003). Lek surveys have the advantage that they may be conducted from the ground and the air and the opportunity to conduct surveys may be greater than other methods that attempt to quantify the size of the lek as discussed below.

Lek Counts. Lek counts are the most basic attempt to quantify changes in the size of a given lek, group of leks, or sample of leks over time. Several counts are usually conducted during the breeding season to estimate the largest number of male sage-grouse attending a lek that year (Jenni and Hartzler 1978, Emmons and Braun 1984). Typically, individual leks are monitored over time and used to estimate trends in the overall population. However, because lek size may be density dependent, and can be affected by weather, proximity of predators or livestock and other disturbance factors, concerns have been expressed that the trend in a given lek may yield biased estimates of population trend.

Lek Routes/Censuses. Lek routes or censuses involve counts of several leks in a given area that represent all or part of a breeding population. This method reduces bias associated with counts of individual leks by attempting to quantify the number and size of leks in a given area. Routes are typically conducted several times each year by an individual observer. In Mono County, CA, individual observers are placed on each lek in a given area on the same day and the maximum count for the composite leks is used as that year's count, this technique reduces potential biases associated with counting individual leks.

Limitations of Lek Data. Several assumptions are made when making inferences about the population from lek count data and little empirical data exists to address the assumptions (Walsh et al. 2004). Beck and Braun (1980) noted that little information was available to address high variability in lek counts, including attendance patterns of adult and yearling males, inter-lek movements, and the number of leks in an area. Emmons and Braun (1984) demonstrated extensive inter-lek movements, suggesting that knowledge of the number of leks was needed in addition to size to understand changes in population size. Walsh et al. (2004) suggested that male lek attendance and visibility of males on leks may be considerably lower than previously thought.

Lek data are sometimes used to estimate population size. Beyond the limitations associated with estimating the number of males, little empirical information exists regarding the relationship of counts of male lek attendance to the female segment of the population (Walsh et al. 2004). Information regarding sex-ratios in sage-grouse currently available comes primarily from hunter-harvested wings, which will be biased if harvest is differential.

Sampling of sage-grouse leks using current methodologies is scientifically problematic. Although sage-grouse tend to use lek sites traditionally, leks may shift, locations or become inactive and new leks may appear. The gradual shifting of a lek's location during a period of many years can influence a lek count. A lek count may be further complicated by the formation of satellite leks that may develop near a large lek during years with relatively high populations (Connelly et al. 2004). Leks are usually counted based on tradition or convenience of access to the site, and counts are not typically taken from a random sample. Most states or provinces use a group of leks that have been counted over time as an index of population trend. Because the number of leks and lek size are thought to be density-dependent (Emmons and Braun 1984), this type of convenience sampling may bias inferences made from population trend data. Furthermore, little sampling occurs in marginally-occupied areas where population numbers are low and extrapolation of lek count data across one broad strata is inappropriate.

Strengths of Lek Data. Some of the basic assumptions with the rationale and protocol for conducting lek surveys have been assessed with the aid of simulated populations (Connelly et al. 2004; Schroeder et al., in prep.). The results suggested that the proportion of males observed on leks and the number of leks regularly monitored are the most important factors in the analysis of trends; more important than the number of years and the size of leks (Schroeder et al., in prep.). Although the number of males attending a single lek may never be known precisely, it is clear that an increase in the number of surveys/lek and the number of leks surveyed (as recommended by Connelly et al. 2003) can improve precision dramatically. Lek count data are the most widespread information available to monitor greater sage-grouse populations and with improvements in consistency of data collection, it appears that lek count data can provide defensible information on long-term trends in populations.

Need

Although lek counts remain the primary method for population monitoring today, concern about their usefulness has been expressed since the early 1980's (Beck and Braun 1980) and more recently (Walsh et al. 2004). Concerns expressed in the literature strongly suggest a

need for more rigorous scientific methods to improve current knowledge of sage-grouse population dynamics and methods for determining population trends. However, information available in the literature is highly disparate and based on short-term local studies. In addition to improved sampling methods, longer-term studies are needed in a variety of locations to better understand sage-grouse population dynamics.

Despite the scientific concerns previously discussed, counting sage-grouse on leks appears to be the most reliable current method for determining population trends over time (Connelly et al. 2004, Schroeder et al. in prep) and all state or provincial wildlife agencies base their surveys on this approach. Individual efforts will continue to be employed by each state and province, based on differing levels of resources, and there is a need to use these data to make inferences about populations across political boundaries. This Strategy calls for analysis of population trends by management zones compared to the analysis conducted in the Conservation Assessment in 2003 (Connelly et al. 2004). To accomplish this, consistent data will need to be available from each state or province that is comparable to the data collected for the 2003 assessment.

Each year, across the range of the species, a great deal of effort is put into monitoring greater sage-grouse populations. More than 50,000 male sage-grouse were counted on leks in 2003 (Connelly et al. 2004). However, not all agencies employ similar techniques and sampling efforts may vary widely among agencies and years. In addition to information regarding population trends, a systematic method is needed to monitor sage-grouse populations. Therefore, this strategy calls for the development of a consistent and scientifically defensible method for determining population distribution and estimating trends across the species' range. Resources available for population monitoring vary among states and provinces, and this strategy will call for methods that designed to improve the efficiency of current efforts and to allow for varying levels of effort and differing methodologies while producing information that is comparable across sage-grouse range. Additionally, this Strategy calls for methods to integrate existing data sets with new information to allow for long-term analyses of population trends.

Population Monitoring Objectives. Sage-grouse monitoring efforts are usually conducted to determine one or more of the following categories: distribution, trend, abundance, and fitness. Data collected for these efforts provides information at multiple spatial and temporal scales. In addition to needs to monitor populations across the range over the long term, there is a need to monitor local populations for response to particular conservation actions. In some cases, data that are collected are useful for monitoring population response at multiple scales over short-time frames (Table 3.1). A combination of monitoring components may be needed to monitor effectiveness of conservation actions in both the short and long term. For instance, the monitoring program for a treatment designed to improve sage-grouse nesting cover may include both a radio-telemetry study, which will directly assess nest success in the short term, and monitoring of local leks to determine population trend over the long term. If nest success responds positively, but population trends do not, other factors may be limiting the population and alternate management strategies are needed with additional monitoring.

Table 3.1. Summary of sage-grouse monitoring objectives, associated methods, and scale of inference.

Method	Population Monitoring Objectives			
	Distribution	Trend	Abundance	Fitness
Lek Surveys	RW – LT			
Lek Counts		RG – LT	RG – LT	
Wing Analyses		RG – LT	RG – LT	RW – LT
Radio-Telemetry	RW – ST			SS - ST
Genetics ¹	RW – LT?		RW – LT?	

Spatial Scale: SS = site-specific

RG = regional

RW = range-wide

Temporal Scale:

ST = Short Term

LT = Long Term

¹Recent and proposed future research suggests that genetics can be used to identify individuals.

Sage-grouse Forum. The Sage-grouse Forum identified several needs for coordination of research and monitoring for sage-grouse populations (cf. Forum SUB-ISSUE: Range-wide research and monitoring collaboration and coordination, including: 1) A framework to encourage data consistency, quality and compatibility, 2) A coordinated program of site-specific research and monitoring projects integrated within the context of the landscape, and 3) Identification of metrics to define success or failure of conservation actions for sage-grouse at multiple spatial and temporal scales. This strategy calls for the development of: 1) A coordinated effort among agencies in the development, experimentation, and implementation of monitoring programs for sage-grouse and 2) The development of expertise to aid local agencies in the design of monitoring programs at the local, regional, and range-wide level.

Research Needs. Several assumptions underlie current inferences made about sage-grouse populations based on lek attendance data. Attempts to quantify the parameters used in population estimation and trend analyses have produced varying results (Emmons and Braun 1984, Walsh et al. 2004). This range of values may represent differences among populations or biases associated with methodologies. Information on sage-grouse population parameters is needed to improve methods for monitoring population trends in a variety of conditions throughout sage-grouse range. This strategy will call for a framework for management experiments comparable across sage-grouse range. This information will be used in an adaptive management framework concurrently with improved survey methods to improve population monitoring over time.

Lek attendance rates. Throughout the species' range, populations of sage-grouse have been monitored and trends assessed by counting males attending leks during the spring breeding season (Beck and Braun 1980). In general, there is a gradual increase in lek attendance by males as females arrive on leks (Eng 1963). Following peak hen attendance, more subadult (yearling) males appear with peak male attendance normally occurring about 3 weeks after peak hen attendance (Patterson 1952, Eng 1963, Jenni and Hartzler 1978, Emmons and Braun 1984). Population trends are based on these peak male counts and lek routes are designed so that ≥ 1 count will occur during this period.

As previously indicated, the lek count method has been criticized for several reasons (Beck and Braun 1980, Walsh et al. 2004) but thus far an alternative monitoring technique has not been developed. In part, these criticisms arose because of some apparent confusion over using lek counts for population estimates rather than to monitor trends (Walsh et al. 2004). Additionally, conflicting data have been published on lek attendance patterns. Emmons and Braun (1984) observed that mean lek attendance was 86% for yearling males and 92% for adult males. They also indicated that 90% of radio-marked yearling male sage-grouse and 94% of radio-marked adult male sage-grouse attended leks during the period of high male counts. In contrast, Walsh et al. (2004) reported that adult male sage-grouse had an average daily attendance rate of 42% while the daily attendance rate for yearlings was 19%. Both studies were conducted in northern Colorado. Reliable knowledge of lek attendance rates is a fundamental piece of information that is needed to estimate sage-grouse population trends and abundance.

Sex ratios. Actual reported sex ratios (males:females) of sage-grouse during autumn vary from 1:1 to 1:2.6 (Patterson 1952, Dalke et al. 1963, Beck and Braun 1978, Autenrieth 1981.) However, much of the information available on sex ratios in greater sage-grouse comes from hunter harvested birds (Autenrieth 1981, Autenrieth et al. 1982). Recent research suggests that adult males and females are not equally vulnerable to hunting, thus sex ratio estimates obtained from harvest data may not be reliable (Connelly et al. 2000, Wik 2002).

Beck (1977) and Connelly (1982) provided some information on sex ratios during winter, suggesting that there may be considerably more females than males in the population. It is also likely that sex ratios may vary among years and areas. However, Beck (1977) reported that sex ratios during winter in North Park, Colorado were 1:1.6 in both years of his study.

Some information is also available, at least indirectly, from research on juvenile sage-grouse. Research on juvenile sage-grouse in eastern Idaho indicated that juvenile sex ratios were very close to 1:1 for birds captured in late summer ($n = 58$, J. W. Connelly personal communication). However, over 3 seasons, Wik (2002) indicated that the sex ratio ($n = 52$) for juveniles captured in western Idaho was 1:1.7 (males:females) and varied from 1:1.4 to 1:2.7. Clearly, sex ratios may vary between age groups and possibly among years and areas. Reliable knowledge of sage-grouse sex ratios will allow development of reasonable population estimates based on rigorous lek surveys.

Population Monitoring Workshops. The Sage and Columbian Sharp-tailed Grouse Technical Committee (Technical Committee) held three population workshops beginning in January 2002. The workshops included leading experts in sage-grouse biology, population dynamics, statistical analysis, and conservation planning/implementation. Consensus from these workshops indicated needs to improve sage-grouse population monitoring in the following areas:

- Monitoring Techniques
- Sampling Approaches
- Data Collection and Storage
- Data Analysis
- Research on Population Dynamics

Under the advice of these workshops, the Technical Committee is currently in the process of developing recommendations for a range-wide population monitoring program. At the broad scale, the Technical Committee will develop recommendations for a uniform sampling method that produces unbiased estimates of population distribution, characteristics, and trends, given differing levels of effort. This protocol will be done by the end of 2007. These broad scale efforts represent the minimum information necessary to monitor populations across the species range. Broad-scale objectives are to:

- (a) Monitor distribution of breeding populations in a consistent manner.
- (b) Monitor relative abundance and trend of breeding populations in a consistent manner.
- (c) Monitor harvest in a consistent manner
- (d) Standardize key fields across the range in databases used for monitoring populations.
- (e) Standardize understanding of terms and concepts used in monitoring populations

At a fine scale, the Technical Committee will propose a framework for conducting management experiments to improve estimation of population parameters, with objectives to:

- (a) Estimate sex ratio of breeding population and its variability.
- (b) Document lek attendance patterns by male sage-grouse.
- (c) Estimate size of breeding population.
- (d) Explore/identify alternate or additional methods for monitoring populations.
- (e) Assess sample size necessary for wing collections to adequately characterize harvested populations of interest.
- (f) Determine the detectability of leks by lek size and observation platform (ground, fixed wing, helicopter)

Habitat Inventory and Monitoring

Introduction

Recovery or maintenance of sage-grouse habitats and populations is contingent on implementation of land management practices that contribute to sage-grouse habitat quality and quantity. Federal and state agencies are preparing a consistent assessment framework that recognizes the cumulative effects of habitat changes at multiple scales, and implications for the conservation and management of greater sage-grouse habitats. Ideally, this framework will be used to evaluate spatial and temporal variation of important components of sage-grouse habitats. The resulting analysis can then be utilized for developing long-term (e.g. land use plans) and short-term (e.g. project proposals) habitat objectives. The Framework should be completed in 2007, and will undergo a separate agency and science review process.

Goals

To complement and facilitate these efforts, a scientifically-based sage-grouse habitat assessment process would allow land managers to:

1. Identify, evaluate, and document existing sage-grouse habitat, habitat suitability, and needed habitat improvements.
2. Evaluate land use proposals on public and private lands that may influence sage-grouse habitat conditions or habitat improvement efforts.
3. Monitor the results of habitat treatments to determine if management actions have achieved the desired affects and that sage-grouse habitat needs have been adequately addressed.
4. Monitor the status of sage-grouse habitat at appropriate scales to assure habitat requirements for sage-grouse populations are being considered across jurisdictional boundaries.
5. Evaluate pertinent land use plan objectives and BLM Standards for Rangeland Health to assure sage-grouse habitat requirements are met when these objectives are addressed.
6. Provide a consistent framework for qualifying and quantifying sage-grouse habitats across state and federal jurisdictions.
7. Develop appropriate map layers to spatially depict habitat conditions for sage-grouse at multiple scales (e.g. improve sagebrush-stitched map, incorporate anthropogenic features) for range-wide analysis purposes.

Connelly et al. (2000) and Connelly et al. (2003) identify key habitat assessment and monitoring issues. However, there is a recognized need to specifically define these and monitoring methodologies that can be consistently applied across agency and state jurisdictions at multiple scales. The Bureau of Land Management, in collaboration with other federal and state agencies, WAFWA, academic institutions, and affected NGOs, has undertaken the task of developing the methodology and protocol for this habitat assessment and monitoring process in its *Framework for Describing Greater Sage-Grouse Habitat* (Framework). When complete (Spring 2007), the Framework will provide federal agencies with technical guidance and procedures to describe existing sage-grouse habitat, and defines common terms and descriptions. Connelly et al. (2003) emphasizes that sage-grouse habitat assessments are needed to: (1) document current or baseline conditions, (2) evaluate success of a habitat restoration program, (3) evaluate effects of potential land treatments, and (4) determine whether an area can support a reintroduced population. Sage-grouse are distributed over large landscapes. Therefore, general procedures are being developed and implemented that describe these habitats at multiple geographic or spatial scales (Connelly et al. 2003). Habitat descriptions needed for federal agency land use plans are much different than those needed at the site or project level. In addition, information collated at a broad scale is often helpful for finer scale descriptions (Quigley et al. 1997, Wisdom et al. 2000, Connelly et al. 2003).

The Framework will be composed of several sections. These sections include standardized habitat terms and descriptions, attributes of sage-grouse habitat suitability for specific scales of interest needed for applying the Framework, integration of information from the various scales for broader or more refined application, detailed procedural steps for describing habitat at mid-, fine, and site-level scale, suggested application of the Framework for land use planning, environmental assessments and monitoring, a Glossary, and Appendices with forms and field procedures.

The Framework is being developed by experienced wildlife biologists from multiple federal and state agencies, universities and conservation organizations, working closely with rangeland and landscape ecologists and botanists. There is a great deal of flexibility provided in the assessment procedure; however a certain degree of professional judgment is required in its application, hence the need for experience. Population and distribution data are limited for many sage-grouse populations in the west, and users of the assessment procedure will frequently be required to use broader scale data, other scientific references, and local information to help describe existing sage-grouse habitat.

There are several excellent references for more detailed information concerning life history or status of sage-grouse or sagebrush ecosystems (Schroeder et al. 1999, Connelly et al. 2000, Miller and Eddleman 2000, Connelly et al. 2003, Connelly et al. 2004). "Guidelines to Manage Sage-Grouse Populations and their Habitats" (hereafter referred to as Guidelines) (Connelly et al. 2000) and "Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats" (Connelly et al. 2004) are the primary syntheses of biological information regarding sage-grouse habitat requirements and needs.

Intended Application

The Framework is designed to provide standardized procedures and documentation formats for describing existing habitat for greater sage-grouse. Habitats are described at the time of the assessment, and are not intended to evaluate site potential or succession. Baseline habitat descriptions are necessary for habitat inventory and monitoring purposes and are the first step to predict future conditions under defined scenarios and assumptions.

The approach in this technical reference is designed to:

- Provide standardized terms and procedures for describing existing habitat.
- Describe sage-grouse habitat relative to site potential, using the best scientific information available.
- Describe existing habitat at various geographic scales (coarse, mid- and fine scales) important for BLM land use planning and management.
- Spatially depict habitats at multiple scales to facilitate analyses at coarse, mid and fine scales.
- Be flexible so that local environmental conditions can be considered.
- Be used by knowledgeable and experienced wildlife biologists in coordination with other specialists.
- Facilitate communication among program disciplines within BLM and interested parties concerning sage-grouse habitat needs.
- Provide a efficient data collection protocol for assessing sage-grouse habitats

The approach described in this technical reference is not designed to:

- Identify the cause(s) of current or baseline sage-grouse habitat conditions.
- Assess sage-grouse population management factors such as predation, hunting or disease.
- Describe existing or baseline habitat conditions for other sagebrush obligate wildlife species, although same procedural steps could be used.

The Framework can be used for a variety of applications; from qualitative descriptions that use habitat suitability worksheets, to long-term monitoring projects that incorporate scientific rigor. Definitions, recommended data collection methods and general suitability descriptions for important habitat indicators at the various scales are presented. All of this is intended to aid in communications concerning sage-grouse habitat and its suitability for sustaining productive populations. In this section some of the applications of the Framework with recommendations concerning the types of data needs are discussed.

Land Use Planning

The Framework provides the tools necessary for describing sage-grouse habitat for all land use planning efforts that may affect habitat. This application extends from land use plans to a 500-acre fuels management project. Baseline habitat Information derived from using the Framework would be included as part of the Existing Environment section of all environmental assessments (EAs) and environmental impact statements (EISs). Baseline information is needed to predict future conditions as a result of proposed management under certain alternatives.

Land Use Plans. Mid-scale habitat indicators can be used to help describe existing and desired future conditions for the planning area. Habitat availability, average patch size, patch isolation, area to edge ratio, edge effect and internal patch disturbances are indicators that would help describe habitat for a land use planning area. The most important mid-scale indicators used for describing existing habitat will vary between BLM field offices. In addition, current trends for the important mid-scale habitat indicators would be helpful for describing desired future conditions for the various alternatives.

Activity and Project-Level Planning. The Framework can be used to describe sage-grouse habitat and predict changes under the alternatives for all activity- or project-level plans and NEPA documents. Quantitative data at this scale is important if adaptive management is part of the project and is needed to quantify changes in sage-grouse habitat. In these cases quantitative data should be collected to measure habitat changes as part of a monitoring protocol.

Standards and Guidelines Assessments for Rangeland Health. The Framework can be used for standards and guidelines at any level of precision desired and should follow general procedures described in Pellant et al. (2005).

Inventory, Monitoring and Adaptive Management

Habitat Inventory. The habitat description process outlined in the Framework is synonymous with the definition of wildlife habitat inventory (Cooperider et al. 1986). It is the initial habitat descriptive effort for an area from which future conditions are predicted and then assessed through monitoring. First time use of the Framework for an area of concern is therefore a habitat inventory work element and not a monitoring effort. Habitat inventory will include the development and integration of spatially explicit information that allows analysis across multiple scales.

Monitoring. Wildlife habitat monitoring consists of repeated measurements of habitat indicators over time to detect habitat changes and in many cases the cause of the changes (Cooperider et al. 1986). Habitat monitoring is usually done for two primary reasons:

1. Measure effects on habitat as a result of a land use that may affect species of concern and its habitat. Monitoring is associated with a specific land use project and indicators sensitive to project-related effects should be measured.
2. Measure habitat change over time for a particular area of concern, irrespective of individual land uses. Monitoring is associated with detecting long-term changes on the landscape.

The Framework can be used to describe baseline habitat conditions for mid- through site-scales and then repeated in the future to evaluate habitat change over time for either of the above reasons. Habitat monitoring will include spatially explicit information that allows analysis across multiple scales, and how these change over time.

Adaptive Management. Adaptive management incorporates monitoring and research into land use planning and implementation. It integrates project implementation with monitoring and research to test project planning assumptions. This kind of management assumes that projects will be changed if monitoring and research data indicate that future conditions were wrongly predicted. The degree of precision and sampling rigor used to describe habitat will be determined by the purpose of the project. However, habitat measurements and repeatability are a prerequisite for adaptive management to detect change. Quantitative data should be collected, particularly for those indicators that will be sensitive to the land use change being proposed.

Conservation Strategies

Implementing Habitat Monitoring

ISSUE: There currently is no consistent methodology for describing sage-grouse habitat for all land use planning activities at various scales which may affect sage-grouse habitats. A standardized process is needed to inventory and monitor sage-grouse habitats and that process should be capable of being modified in an adaptive manner if more information becomes available or if land use planning assumptions change

Sub-Issue: Develop a habitat assessment framework that can be used consistently across state and federal agency jurisdictions to inventory and monitor sage-grouse habitats.

OBJECTIVE 1: Develop techniques to describe and assess sage-grouse habitats to be used in habitat inventory and monitoring efforts at multiple scales that support land use planning activities and project implementation.

Conservation Strategy	Who (lead agency is in bold)	When
Incorporate Habitat Assessment Framework mid-scale analyses into Land Use Plan Revisions	BLM, USFWS, USFS, Park Service, NRCS, USGS-BRD, State wildlife agencies	At revision or amending of land use plans
Incorporate Habitat Assessment Framework fine scale analyses into project planning and implementation		Project assessments and decisions
Insure consistency of habitat framework assessment and rangeland health guidelines		Land Use Plans and Project assessments and decisions
Inventory - Utilize habitat framework assessment for evaluating amount and distribution of sage-grouse habitats at population scale		Complete within 5 years
Monitoring - Utilize habitat framework assessment for evaluating trends of sage-grouse habitats at population scale		Every 5 years following inventory
Inventory Feedback - Insure incorporation of inventory data from habitat framework assessment is incorporated into land use planning and project level decisions		As inventories are completed – within 5 years; incorporate inventory findings into management guidance
Monitoring Feedback - Insure incorporation of monitoring data from habitat framework assessment is incorporated into land use planning and project level decisions		Every 5 years, change management as appropriate based on monitoring feedback

ISSUE: There is currently no standardized and statistically rigorous method to monitor the status and trend of sage-grouse populations at local regional and range-wide scales.		
SUB ISSUE: Sage-grouse population monitoring		
OBJECTIVE 1: Develop techniques to monitor greater sage-grouse populations to detect changes in their populations at local, regional, and range-wide scales.		
Conservation Strategy	Who (lead agency is in bold)	When
Develop standardized methods for monitoring distribution, trend, and abundance of sage-grouse populations.	WAFWA, Sage and Columbian Sharp-tailed Grouse Technical Committee	1 st quarter 2007
Develop sampling strategies that reduce biases associated with current monitoring techniques.		2 nd quarter 2007
Develop population monitoring accuracy goals (ability to detect differences or changes) over biologically significant time periods.		2 nd quarter 2007
Develop consistent data collection standards and definitions that are used across the range of the species.		3 rd quarter 2007
Develop a process by which data collection and analyses is coordinated for sage-grouse management zones.		3 rd quarter 2007
Develop a list of recommended research needs to improve uncertainties in the underlying assumptions in current monitoring techniques.		4 th quarter 2007
Produce a techniques manual that outlines the results.		4 th quarter 2007

ISSUE: There is need to implement new population monitoring techniques through a scientific process including peer-review and experimentation so that the techniques meet a highest possible scientific standards.		
OBJECTIVE 1: Facilitate the review, experimentation, and implementation of the techniques manual.		
Conservation Strategy	Who (lead agency is in bold)	When
Once the techniques manual is developed, conduct a peer review of its contents and scientific quality	WAFWA, Sage and Columbian Sharp-tailed Grouse Technical Committee	1 st quarter 2008
Implement new techniques on an experimental basis and validate		2008-2009
Revise techniques as appropriate and implement range-wide		2010

ISSUE: There is a need to develop metrics to evaluate effectiveness of conservation actions to sage-grouse populations at local, regional, and range-wide scales.		
OBJECTIVE 1: Provide information and expertise to local agencies and working groups to help evaluate the effectiveness of on-the-ground conservation and management actions to sage-grouse populations;		
Conservation Strategy	Responsible Parties (lead agency is in bold)	Timeline
Produce recommended metrics for monitoring sage-grouse populations	Consortium¹/Technical Committee	Begin 2008
Provide expertise to local agencies and biologists for monitoring sage-grouse populations		

¹ Refer to Chapter 7 which discusses the role of the consortium

ISSUE: There is a need for infrastructure/resources to complete, implement, and evaluate new population monitoring techniques and provide biological expertise on monitoring to local agencies and working groups
OBJECTIVE 1: Develop infrastructure/resources to complete, implement, and evaluate new population monitoring techniques and provide biological expertise on monitoring to local agencies and working groups
See Chapter 6

Chapter 4

Implementation

Monitoring

Sub-Strategy



CHAPTER 4

Implementation Monitoring Sub-Strategy

Background

The success of the greater sage-grouse conservation effort is dependent upon a series of actions that monitor not only the responses of habitat, sage-grouse and other wildlife species to treatments, but the actual commitments to conservation planning, action plans and implementation of those efforts by responsible parties. The implementation monitoring sub-strategy provides strategies and products for reporting activities for evaluating implementation progress.

The U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration's (NOAA) 2003 Policy for Evaluation of Conservation Efforts (PECE) identifies the need to monitor implementation of conservation efforts. PECE is an important component of the evaluation protocols used by the USFWS in their deliberation on merits of listing species. The policy explicitly identifies nine points of consideration to determine the likelihood that a conservation action will be implemented. These nine points of consideration include,

"1) The conservation effort, the party(ies) to the agreement or plan that will implement the effort, and the staffing, funding level, funding source, and other resources necessary to implement the effort are identified. 2. The legal authority of the party(ies) to the agreement or plan to implement the formalized conservation effort, and the commitment to proceed with the conservation effort are described. 3. The legal procedural requirements (e.g. environmental review) necessary to implement the effort are described, and information is provided indicating that fulfillment of these requirements does not preclude commitment to the effort. 4. Authorizations (e.g., permits, landowner permission) necessary to implement the conservation effort are identified, and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the effort will obtain these authorizations. 5. The type and level of voluntary participation (e.g., number of landowners allowing entry to their land, or number of participants agreeing to change timber management practices and acreage involved) necessary to implement the conservation effort is identified, and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain that level of voluntary participation (e.g., an explanation of how incentives to be provided will result in the necessary level of voluntary participation). 6. Regulatory mechanisms (e.g., laws, regulations, ordinances) necessary to implement the conservation effort are in place. 7. A high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain the necessary funding. 8. An implementation schedule (including incremental completion dates) for the conservation effort is provided. 9. The conservation agreement or plan that includes the conservation effort is approved by all parties to the agreement or plan."

In addition to the PECE evaluation, WAFWA members need a tool to better evaluate the activities and implementation schedules of the greater sage-grouse conservation efforts. An implementation monitoring program provides an inventory of performance. The program will also identify the geographical extent and types of treatments as well as gaps in conservation efforts while providing data for PECE.

Data Considerations

The combined greater sage-grouse conservation efforts generate, use and evaluate significant quantities of data. Conservation efforts or treatments often require review and evaluation of information from various sources and data of variable quality. The evaluation of effectiveness of a conservation effort requires the collection, storage and analysis of data in an objective and scientifically credible treatment.

Data Quality Act (The Information Quality Act (IQA)). The IQA, sometimes referred to as the Data Quality Act, was enacted in December 2000 as Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (P.L. 106-554.) The Act in its entirety:

(a) IN GENERAL. — The Director of the Office of Management and Budget shall, by not later than September 30, 2001, and with public and Federal agency involvement issue guidelines under sections 3504(d)(1) and 3516 of title 44, United States Code, that provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies in fulfillment of the purposes and provisions of chapter 35 of title 44, United States Code, commonly referred to as the Paperwork Reduction Act.

(b) CONTENT OF GUIDELINES. — The guidelines under subsection (a) shall (1) apply to the sharing by Federal agencies of, and access to, information disseminated by Federal agencies; and (2) require that each Federal agency to which the guidelines apply (A) issue guidelines ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by the agency by not later than 1 year after the date of issuance of the guidelines under subsection (a); (B) establish administrative mechanisms allowing affected persons to seek and obtain correction of information maintained and disseminated by the agency that does not comply with the guidelines issued under subsection (a); and (C) report periodically to the Director (i) the number and nature of complaints received by the agency regarding the accuracy of information disseminated by the agency; and (ii) how such complaints were handled.

Provisions of the IQA have been applied to deliberations regarding federal sage-grouse decision-making in the past. We anticipate that sage-grouse management data will continue to be evaluated using the IQA. The standards identified in the IQA should be fully considered when using data in support of conservation efforts.

Metadata. The primary functions of metadata, which is defined as information about data, include the facilitation of the retrieval, integrity, and management of records. Further, metadata allows an evaluation of the context, structure, and content of data. Finally, metadata provides a record of the history and veracity of the data record. Data gathered and stored by the sage-grouse conservation partnership are widely distributed geographically and by ownership. Metadata strategies ideally will allow users to find, retrieve and evaluate data from all of the partners. Partners collecting data from conservation activities should collect and archive metadata to provide the maximum utility of the data.

Data Ownership. Data are collected by nearly all parties conducting greater sage-grouse conservation efforts. Most of these data are proprietary and control, access, and ownership belong to the collecting partner. Range-wide data management strategies must be sensitive to

ownership issues including Freedom of Information Act or comparable data access laws or regulations. Some datasets, particularly those involving projects on private lands, may be difficult to collect because of privacy issues. The strategies should be sensitive to those issues and develop alternatives to account for these projects. Inventory of existing datasets and emerging datasets has been difficult because of the number of data collectors, format, and storage of these data. Currently, most datasets reside within the collecting agency. Some datasets have been shared in data portals such as SAGEMAP (<http://sagemap.wr.usgs.gov/>).

Scope of Activity Reporting

One important component of successful implementation of the Strategy is the commitment to conservation at multiple scales. A challenge of the Strategy is to encompass what is being done at state and local scales, recognizing the contributions made by private, state, and federal land owners, state, provincial and federal wildlife agencies, NGOs, tribal entities, and private stake-holders, while at the same time provide guidance and feedback from a range-wide perspective. The approach to conservation efforts varies among and within each state or province. The conservation planning documents and management guidelines created by these partners are in various stages of completion and come in a variety of formats. Additionally, the protocols for reporting and transferring information pertaining to their conservation efforts are also quite diverse. The ability to keep track of planning and implementation schedules, as well as outcomes from the actions and where potential data gaps may exist, is facilitated by the use of well organized and consistent data.

Scope of Conservation Efforts. Currently nine of the eleven states have state-wide conservation or recovery plans including: California (joint with Nevada), Idaho, Montana, North Dakota, Nevada, Oregon, Utah, Washington, and Wyoming. Colorado recently completed a similar effort for Gunnison Sage-grouse and expects to have a plan completed for greater sage-grouse in July, 2007. South Dakota is also in the process of completing a state-wide conservation plan. Most state and provincial plans are strategic in nature; however, most plans have identified some conservation efforts that are appropriate for their respective jurisdiction.

Community-based Local Working Groups (LWG) have become an integral part of sage-grouse conservation in many of the western states. LWGs represent a wide variety of stakeholders including: federal and state agencies, tribal and local governments, private landowners, livestock and energy industries, and conservation groups. LWGs are addressing conservation concerns specific to their area and are developing local planning documents in tandem with the state-based plans. To date, 52 LWGs have been established range-wide, 39 of which already have (or expect to have) local conservation plans in place by December, 2006 (Table 4.1). Another two are expected by December, 2007, and six by December 2008. The LWG model has not been employed in three of the states (i.e. Washington, North Dakota, and South Dakota), nor Saskatchewan, where sage-grouse populations are relatively small and somewhat isolated. Instead, they have formed a single state-wide sage-grouse team or operate under the Canadian Sage Grouse Recovery Team respectively, to plan and direct conservation efforts. Many of the LWG conservation plans are two-pronged, in that their “strategic” goal-oriented statements are complemented with a “tactical” list of actions designed to achieve those goals. (Table 4.1)

Federal agencies including: the Bureau of Land Management, U.S. Forest Service, U.S. Fish and Wildlife Service, Department of Energy, Department of Defense, and numerous tribal nations control more than 70% of all sage-grouse habitat. These agencies and nations may initiate sage-grouse conservation efforts that fall outside the efforts of states, provinces or LWGs. The remaining 30% of sage-grouse habitat largely falls within the private domain. These private lands are critically important to sage-grouse and sage-grouse conservation efforts, because of their inherent productivity, water and relationship with federal lands. Non-governmental organizations, Natural Resources Conservation Service (NRCS), and Farm Services Agency (FSA) work directly with private landowners. Sage-grouse conservation efforts by these parties can affect the sage-grouse habitat on private lands, but are not necessarily reported through traditional reporting processes.

Greater sage-grouse conservation treatments form the cornerstone of the primary goals of the Strategy. The number of stakeholders involved in the prescription and administration of treatments, conservation efforts, and research exceed 100 parties. The treatments vary greatly in geographical and temporal scales, goals, objectives, funding, partners, and monitoring. The number of sage-grouse conservation efforts, with a mature conservation program, will likely be numbered in the thousands. Every conservation effort has value and it is important to tally what is being done, where it is being done, why it is being done, and who is doing it. The vision of this Strategy is to have states, agencies, and partners establish and maintain a long-term coordinated system that will inform biologists and other decision makers of the progress being made on implementation of strategies designed to preserve and, where possible, enhance sage-grouse populations by protecting and developing healthy sagebrush ecosystems.

Reporting Progress

A synthesis of range-wide conservation information requires a well-coordinated comprehensive approach to ensure that certain core data are collected from all entities working with sage-grouse. These data should be reported in a timely and cost effective manner so a thorough and relatively seamless range-wide report can be supported. The creation of a range-wide database will be used to identify gaps in information and geographic coverage of conservation efforts. Moreover, it will provide a consistent and timely means to keep track of conservation planning updates and project implementation. The end product will be a semi-automated, spatially explicit reporting tool that biologists and policy-makers can use to make informed decisions. The database will be provide users the ability to "ad hoc" query and produce time certain reports.

Computer-based Spatially Oriented Query Database. One goal of this Strategy is to present information about conservation planning and project implementation geographically. This requires that project information be provided with the appropriate spatial information as either a location description or a Geographic Information System (GIS) file. Using a standard internet browser, conservation planning information will be made so that it is spatially oriented, readily accessible, easy to use, and provides solid information that can be incorporated into decision-making. This web-based inquiry system will enable periodic updates on conservation planning and implementation progress including: identification of specific conservation issues and goals, project descriptions, implementation schedules, dollars spent, and project partners for

any state, province, LWG, or other responsible reporting entity. The semi-automated reporting mechanism will meet another important goal of the Strategy to help individual groups keep track of their conservation planning schedules and conservation actions.

A recently developed web-based project that meets some of these objectives is the Sage-grouse Local Working Group Locator (<http://greatbasin.nbii.gov/lwg/index.asp>) (Figure 4.1). The LWG Locator provides the structure of a geographic database and a range-wide communication network; however it would need to be developed further to be capable of handling the full-scale objectives of the Implementation Monitoring Sub-strategy. The tracking of implementation schedules and outcomes, funding sources, and reporting tools, would require further development. The site was designed for and about LWGs but has the potential to expand and include a broader collection of partners (e.g. universities, federal agencies, tribal entities, non-government agencies, etc). The National Biological Information Infrastructure (NBII) provided the base funding for this project, which is being served in conjunction with the Great Basin Information Project (<http://greatbasin.nbii.gov/>) and SAGEMAP (<http://sagemap.wr.usgs.gov/>).

Program Generation. The generation of range-wide reports will require three primary steps: 1) the data must be collected from the various planning groups; 2) that information must be integrated into the regional database; and 3) the web-based spatially oriented reporting tool must be created and made available for use. Some of the factors to determine how best to collect and disseminate this information include: what core variables are needed, when and how the data requests and updates are made, who maintains the database over time, and what are the possibilities of reporting styles.

All projects typically involve a federal, state, or provincial agency in the form of financial support, personnel, or land base. The representative agency is a valuable resource that can facilitate the information exchange between the planning group and Intermountain Joint Ventures. For instance, LWGs report to their state or provincial sage-grouse coordinator. Federal agencies have various reporting protocols, but if planning and project information could be funneled to a key contact or state-level reporting node (i.e. field offices to the state office), this would help centralize and streamline their information for integration into the range-wide database.

One strategy for obtaining information from designated contacts may be a periodic email survey (e.g. Survey Monkey), where questionnaires are sent out requesting the most recent updates to current reports and planning activities. Alternatively, the planning and project information could be uploaded directly by project managers to an on-line database, provided that certain quality control measures are in place to protect the integrity and consistency of the data. A third option would be to have each reporting entity (i.e. state, province, LWG, etc.) include a "recent updates" section on their respective websites, which would be accessible as a downloadable file.

The web-based reporting tool will allow users to query by location (i.e. "clicking and dragging" over an area of interest) or by planning entity (i.e. select from a list of planning entities) to download information including conservation reports, planning timelines, and project

information. The reporting program will be designed as a semi-automated and self-sustaining mechanism that is readily accessible, intuitive, and adjustable to meet future needs and interests. Where issues of confidentiality are involved, some data may be limited to authorized users only. Ideally, new planning and project information will be uploaded directly and routinely so that the regional database remains current and complete. An example of how this might work is the National Wildlife Habitat Project Registry (<http://geodataservicesinc.com/nwhpr/>), an interactive website created by Geodata Services, Inc. provides habitat project information for multiple species nation-wide.

Data Host. The range-wide database and web-based reporting system will require the stability of a long-term data host. A likely candidate is the U.S. Geological Survey (USGS) because of their well established commitment to sage-grouse and sagebrush issues, technical expertise, and non-regulatory status as an agency. In addition, many are familiar with the USGS website, Sagebrush and Grassland Ecosystem Map Assessment Project or SAGEMAP (<http://sagemap.wr.usgs.gov/>), which currently hosts the Range-wide Sage-grouse Conservation Assessment and all associated spatial datasets used in the assessment. The Range-wide Sage-grouse Conservation Strategy would fit neatly into the framework of SAGEMAP.

Another potential host is the National Wildlife Habitat Project Registry (see description above). Geodata Services, Inc. was granted funding from the National Fish and Wildlife Foundation and Anheuser-Busch Companies, Inc. along with support from multiple other founding partners to develop a central clearinghouse where potential partners can share project information and cooperatively leverage funds for future conservation efforts. The site allows the user to: 1) upload new project information along with a spatial reference; 2) search previously recorded projects by location or by management entity; and 3) generate reports with project information such as the project description, who donated time and funding, and local recognition. One primary benefit of the Wildlife Habitat Project Registry is the database infrastructure has already been created and is in use for multiple wildlife species, many of which occur within the range of sage-grouse.

In light of the many partners and potential data hosts, to ensure the greatest economic and mechanical efficiency, the Implementation Monitoring Sub-strategy requires a fully integrated semi-automated system that draws upon existing resources, while effectively channeling that information into a usable and replicable format. The personnel, computing resources, and networking capabilities will need to be clearly identified. Ideally, each reporting entity will designate a single point of contact who will work closely with the party responsible for assembling, filtering, posting, and managing the database. Long-term data storage requirements and issues pertaining to data ownership will also need to be addressed. Each reporting entity will directly benefit from having a formalized information collection and reporting process by assisting them to keep track of their own implementation schedules and progress as well as identify the different elements required to meet PECE standards. Decision-makers will have improved access to specific information based on geographic area of interest through the queryable database. Ultimately, the success of the reporting system will be dependent on the flexibility, cooperation, and commitment of all partners.

Conservation Strategy

Issue: Develop a short-term (until NASECA passage) commitment to develop, implement and house the implementation monitoring database.		
Objective: Meet with partners that have been involved with the implementation monitoring strategy and develop a commitment for program development and resource needs		
Conservation Strategy	Who (lead agency is in bold)	When
Convene a meeting with partners to determine commitments and resource needs.	WAFWA , Utah State University, USGS (SAGEMAP) and Wildlife Habitat Registry	1 st Quarter 2007
Develop software to capture and display implementation data and reporting system. Provide secure housing for data.	Partner , WAFWA	3 rd Quarter 2007
Develop a system to populate the database with input from the conservation action implementers	Partner	3 rd Quarter 2007
Report implementation monitoring progress	Partner , WAFWA	3 rd Quarter 2007, "Ad Hoc", sub-strategy progress reports and annual reports

Table 4.1. Survey of planning schedules and progress by LWGs range-wide.

State/Province	Lead Agency*	State/Provincial Plan Complete Date (completed or anticipated)	Single State-wide or Provincial Group	Number LWGs currently in place	Number LWGs with completed Plans	Number LWGs with Plans anticipated by Dec 2006	Number LWGs implementing projects**	Number LWGs planning projects or in draft stages of Plan	Number LWGs in early phases of group development; Meeting
CA	CDFG/BLM	Jun-04		3 (2 shared with NV, 1 with OR & NV)	(2 shared with NV)	1	2 (2 shared with NV)		
CO	CDOW	Jul-07		5	3	1	3	2	
ID	IDFG	Jul-06		10	1	5	0	6	4
MT	MDFWP	Feb-05		3	working from state plan	0	0		3
ND	ND DGF	Jul-05	yes	n/a	working from state plan	n/a	1		
NV	NDOW	Jun-04		7 (2 shared with CA)	7 (2 shared with CA)	0	6 (2 shared with CA)	1	
OR	ODFW	Aug-05		5	working from state plan	0	5	5	
SD	SD DGFP	in progress	yes	n/a	will work from state plan	n/a	0		
UT	UDWR/UT's CBCP	Jun-02		12 (1 = Gun SG)	1	11	10	11	1
WA	WDFW	May-04	yes	n/a	working from state plan	n/a	1		
WY	WDGF	Jul-03		8	0	8	8	8	
Alberta	ADFW	Dec-06	yes	1	working from national plan	1	1		
Saskatchewan	SERM	Jul-01	yes	n/a	working from national plan	n/a	1		
TOTALS:				51	12	26	36	33	8
* CDFG/BLM = California Department of Fish & Game/Bureau of Land Management; CDOW = Colorado Division of Wildlife; IDFG = Idaho Department of Fish & Game; MDFWP = Montana Department of Fish, Wildlife & Parks; ND DGF = North Dakota Department of Game & Fish; NDOW = Nevada Division of Wildlife; ODFW = Oregon Department of Fish & Wildlife; SD DGFP = South Dakota Department of Game, Fish & Parks; UDWR/UT's CBCP = Utah Division of Wildlife Resources/Utah's Community-based Conservation Program; WDFW = Washington Department of Fish & Wildlife; WDGF = Wyoming Department of Game & Fish; ADFW = Alberta Fish & Wildlife Division; ADFG = Alberta Division of Fish & Wildlife; SERM = Saskatchewan Environment and Resource Management.									
** Projects identified in Conservation Plans (or draft Plans).									

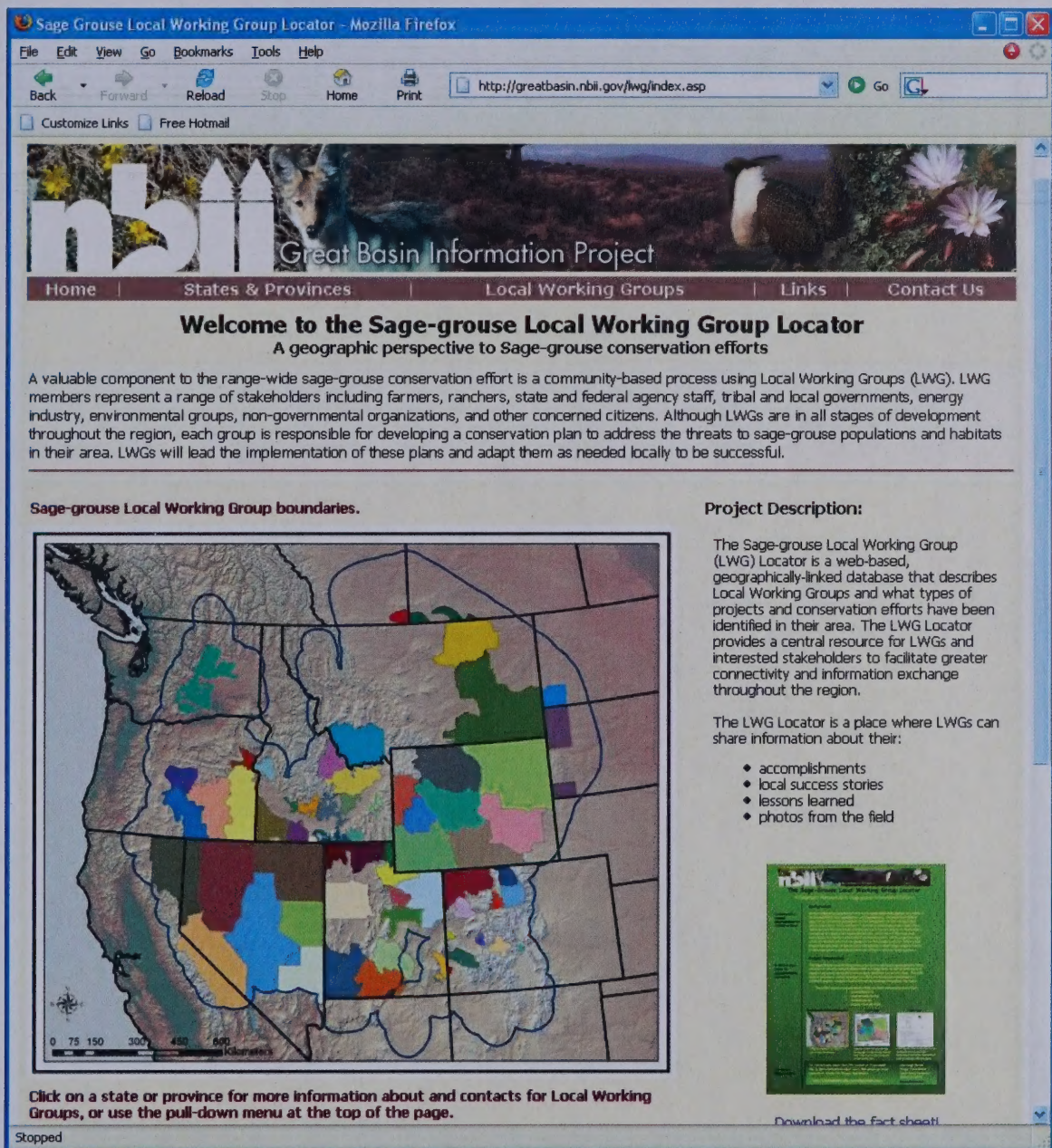


Figure 4.1. The Sage-grouse Local Working Group Locator home page.

Chapter 5

Research and Technology

